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An issued or revision date for these instructions is included for the users information. In the event two years have elapsed between this date and product use, the user should contact Bard Access Systems, Inc. to see if additional product information is available.

Revision date: May, 2006.

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SITE RITE^{*} IV

ULTRASOUND SYSTEM

TECHNICAL MANUAL

BAIRD
ACCESS SYSTEMS



Do not operate
in the presence
of flammable
anesthetics



Dot Markers
Active



Dot Markers
Inactive



Dangerous
Voltage



Warning : Refer to
Manual Before Use



Refer to Manual
Before Use



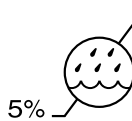
Power/
Stand-by



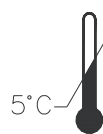
Do Not Dispose
of Battery Pack
In Fire



Medical Electrical Equipment
Classified by UL with respect
to Electrical Shock, Fire, and
Mechanical Hazards only in
accordance with UL 2601-1
and CAN/CSA C22.2 No. 601.1



Humidity
Parameters



Storage
Temperature
Parameters



Temperature
Fault



AC Adapter



Freeze Image



Unfreeze Image

R_x ONLY

Prescription
Only



Battery Pack



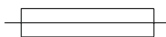
Fragile



Ultrasound
Probe

cm

Depth (In
Centimeters)



Fuse



Decrease
Brightness



Increase
Brightness



Equipotential
Connector



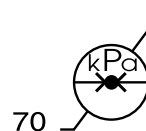
BF Type
Equipment



Reversal



Ground



Pressure
Parameters



0344
European
Conformity



Do Not Open or
Tamper With



Gain



Caution! Hot
Surface



Do not dispose with
ordinary municipal waste

NEXERGY NX1210MU6DBNNZ-001




DO NOT OPEN IN THE PRESENCE
OF FLAMMABLE ANESTHETICS



⊖ 120 V~

50 - 60 Hz

Class 2 Power unit



⊖ 100 - 250 V

50 - 60 Hz



⊖ 14.4V=/1.0A

EGSTON Eggenbug Austria

ATTENTION POUR UTILISATION
L'INTERIEUR SEULEMENT



CAUTION Risk of electric shock
Dry location use only



SN 02C00055

D374657 42560

US Version

NEXERGY NX1210ME6DBNNZ-001




DO NOT OPEN IN THE PRESENCE
OF FLAMMABLE ANESTHETICS



⊖ 120 V~

50 - 60 Hz

Class 2 Power unit



⊖ 100 - 250 V

50 - 60 Hz



⊖ 14.4V=/1.0A

EGSTON Eggenbug Austria

ATTENTION POUR UTILISATION
L'INTERIEUR SEULEMENT



CAUTION Risk of electric shock
Dry location use only



SN 02C00055

D374657 42560

EU Version

TABLE OF CONTENTS

TABLE OF CONTENTS..... i

LIST OF ILLUSTRATIONS..... ii

NOTICE..... iii

WARNINGS & PRECAUTIONS..... iii

NOTES..... v

SAFETY DATA..... vii

ACRONYMS AND ABBREVIATIONS viii

SERVICE EQUIPMENT REQUIREMENTS LIST viii

SITE-RITE^{*} IV TRANSDUCER ASSEMBLY SERVICING 1

SITE-RITE^{*} IV SYSTEM DESCRIPTION 1

POWER SOURCE 2

 AC Adapter..... 2

 Battery Pack..... 2

TRANSDUCER ASSEMBLY 2

SCANNER ASSEMBLY 4

 Power Supply PCB..... 4

 Digital PCB 5

 Front End LCA..... 6

 Video LCA..... 6

 Filter LCA..... 6

 Pulser/Receiver PCB 6

 Servo PCB 7

 SODMM Modules 7

 Button PCB 7

 LCD PCB..... 7

SITE-RITE^{*} IV CONTROLS AND INDICATORS..... 8

 Scanner Assembly Controls..... 8

 Scanner Assembly Indicators..... 8

SITE-RITE^{*} IV SYSTEM TROUBLESHOOTING 9

SITE-RITE^{*} IV ERROR MESSAGES 14

SITE-RITE^{*} IV MODULE REMOVAL AND INSTALLATION 15

SCANNER ASSEMBLY CASE REMOVAL
AND INSTALLATION PROCEDURE..... 15

SITE-RITE^{*} IV SYSTEM SPECIFICATIONS..... 15

 SITE-RITE^{*} IV Scanner Assembly Specifications 15

 SITE-RITE^{*} IV AC Adapter Specifications..... 16

 SITE-RITE^{*} IV Battery Pack Specifications..... 16

TRANSDUCER ASSEMBLY SPECIFICATIONS..... 16

 9.0 MHz Transducer Assembly 16

 7.5 MHz Transducer Assembly 16

APPENDIX A - PRINTED CIRCUIT BOARD LAYOUT DRAWINGS 17

APPENDIX B - MECHANICAL ASSEMBLY DRAWINGS..... 50

APPENDIX C - BILLS OF MATERIAL 58

 Site-Rite^{*} IV Scanner Assembly..... 58

APPENDIX D - JUMPER DEFINITIONS..... 59

 Digital PCB Jumper Definitions 59

 Servo PCB Two Pin Jumper Definitions 60

LIST OF ILLUSTRATIONS

FIGURE 1 - SITE-RITE* IV SYSTEM BLOCK DIAGRAM 1

FIGURE 2 - MOTOR - TRANSDUCER CONFIGURATION 3

FIGURE 3 - TRANSDUCER MOTOR OSCILLATION 3

FIGURE 4 - SITE-RITE* IV SCANNER BLOCK DIAGRAM 4

FIGURE 5 - POWER SUPPLY BLOCK DIAGRAM 5

FIGURE 6 - DIGITAL PCB FLOW CHART 5

FIGURE 7 - PULSER/RECEIVER PCB FLOW CHART 6

FIGURE 8 - SERVO PCB FLOW CHART 7

FIGURE 9 - SCANNER ASSEMBLY FRONT PANEL 9

FIGURE B-1 - SCANNER BOTTOM CASE ASSEMBLY 51

FIGURE B-2 - SCANNER BEZEL ASSEMBLY 52

FIGURE B-3 - SCANNER MOTHERBOARD ASSEMBLY 53

FIGURE B-4 - SCANNER MOTHERBOARD ASSEMBLY
EXPLODED GROUND STUD CONNECTION 54

FIGURE B-5 - SCANNER LCD ASSEMBLY 55

FIGURE B-6 - SCANNER PCB CARD ASSEMBLY 56

FIGURE B-7 - SCANNER TOP CASE ASSEMBLY 57

WARRANTY

The manufacturer, Bard Access Systems, warrants this product against defects in material or workmanship for a period of one year from the date of original purchase, and agrees to repair, or at Bard Access Systems discretion, replace any defective unit free of charge. The warranty on the repaired or replaced unit continues from the purchase date of the original unit.

This warranty does not cover damages resulting from misuse, abuse, modification, or alteration of the *Site-Rite IV Ultrasound System*.

The following actions void the warranty of the *Site-Rite IV Ultrasound System*.

- Opening or servicing the scanner or the probe housing.
- Removal of system labels by anyone other than by Bard Access Systems authorized service personnel.
- Opening or servicing the battery pack, A/C adapter, *Charge-Rite Battery Charger*, or the *Site-Rite Mini Battery Charger* by anyone other than Bard Access Systems authorized service personnel.
- Connecting the *Site-Rite IV Scanner* to any battery source other than the *Site-Rite IV Battery Pack*.
- Connecting the *Site-Rite IV Battery Packs* to any charger other than *Site-Rite Mini Battery Charger*.
- Connecting the *Site-Rite IV Scanner* to any A/C adapter other than the one provided with the scanner.

THIS LIMITED PRODUCT WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES RESPECTING THIS PRODUCT, WHETHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Some states may not allow exclusion of implied warranties. You may be entitled to additional remedies under state law.

IN NO EVENT WILL BARD ACCESS SYSTEMS, INC. BE LIABLE TO YOU FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM YOUR HANDLING OR USE OF THIS PRODUCT.

Some states do not allow an exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you.

This limited product warranty gives you special legal rights regarding this product, and you may also have other rights against Bard Access Systems, Inc. which vary from state to state.

Warnings, Precautions and Notes

Warnings

- Warning:** This product should only be operated by qualified medical personnel.
- Warning:** Do not remove outer protective covers from the Site-Rite IV Scanner. Hazardous voltages exist at several points within the system.
- Warning:** Do not operate the Site-Rite IV Ultrasound System, Charge-Rite® Battery Charger or the Site-Rite Mini Battery Charger in the presence of flammable anesthetics or gases. Explosion may result.
- Warning:** Do not use for ophthalmic indications. Ophthalmic use may cause patient injury.
- Warning:** Misuse of the Site-Rite IV Ultrasound System may result in damage to the equipment or personal injury.
- Warning:** Use only the Charge-Rite Battery Charger or Site-Rite Mini Battery Charger to charge Site-Rite IV Battery Packs. Use of any other charger to charge Site-Rite IV Battery Packs may damage the battery packs and will void your warranty.
- Warning:** Only connect a Site-Rite IV A/C Adapter to the Site-Rite IV Ultrasound System. Use of any other A/C Adapter may cause intermittent or unpredictable operation, may damage the system and will void your warranty.
- Warning:** Never connect a Site-Rite IV A/C Adapter to the Charge-Rite Battery Charger or Site-Rite Mini Battery Charger.
- Warning:** Never incinerate a battery pack.
- Warning:** Only use the battery packs or A/C adapter to power the scanner.
- Warning:** If a probe is damaged in any way, discontinue use immediately. Damage to the scanner may occur.
- Warning:** Do not subject the probe to mechanical shock. Dropping it or slapping it against an object, such as the palm of the hand, may dislodge sensitive components and cause intermittent or unpredictable operation.
- Warning:** Do not subject the probe to excessive vibration. Vibration may dislodge sensitive components and cause intermittent or unpredictable operation.
- Warning:** Use only **Bard Access Systems'** probes with this system. Use of unapproved probes may result in patient injury or equipment damage.
- Warning:** When using Site-Rite Needle Guides on the fluid standoff probes, use only sterile, legally marketed plastic probe covers that are 1 mil (0.001 inch or 0.0254 mm) thick.
- Warning:** Do not allow liquid to enter the scanner, Charge-Rite Battery Charger, Site-Rite Mini Battery Charger, Battery Packs, A/C Adapter, Probe Connector or Probe Port. Damage to the equipment may occur.
- Warning:** Do not attempt to sterilize the Site-Rite IV Scanner or Probes with ethylene oxide or heat sterilization methods. Damage to the equipment may occur.
- Warning:** Never use probes that are out of alignment for needle guidance.
- Warning:** Always properly dispose of dead battery packs in accordance with local regulations. Improper disposal may present an environmental hazard.
- Warning:** Only qualified personnel should attempt to service this equipment. The Site-Rite IV contains static sensitive components and circuits. Failure to observe proper static control procedures may damage the system.
- Warning:** The Site-Rite IV Ultrasound System contains dangerous voltages. Service attempts by unqualified personnel may result in serious injury or death.
- Warning:** The following actions void the warranty of the Site-Rite IV Ultrasound System.
- Opening or servicing the scanner or the probe housing.
 - Removal of system labels by anyone other than by Bard Access Systems' authorized service personnel.
 - Opening or servicing the battery pack, A/C adapter, Charge-Rite Battery Charger, or the Site-Rite Mini Battery Charger by anyone other than Bard Access Systems authorized service personnel.

-
- Connecting the Site-Rite IV Scanner to any battery source other than the Site-Rite IV Battery Pack.
 - Connecting the Site-Rite IV Battery Packs to any charger other than the Charge-Rite Battery Charger or the Site-Rite Mini Battery Charger.
 - Connecting the Site-Rite IV Scanner to any A/C adapter other than the one provided with the scanner.
- Warning:** Contains n-Butyl Phthalate (C₁₆H₂₂O₄): Causes eye irritation. May cause skin irritation. Inhalation of high vapor concentrations may be harmful. Avoid contact with eyes, skin, clothing. Avoid breathing vapors. Use with adequate ventilation. Keep container closed. Wash thoroughly after handling. Ingestion of large quantities may cause liver or kidney damage.
- Warning:** DO NOT install both Jumper J4 and Jumper J5. If Jumper J4 is installed, Jumper J5 MUST BE REMOVED. If Jumper J5 is installed, Jumper J4 MUST BE REMOVED. When both jumpers are installed, POWER IS CONNECTED DIRECTLY TO GROUND. This WILL DESTROY the Digital PCB and may result personnel injury.
- Warning:** DO NOT install both Jumper J23 and Jumper J24. If Jumper J23 is installed, Jumper J24 MUST BE REMOVED. If Jumper J24 is installed, Jumper J23 MUST BE REMOVED. When both jumpers are installed, POWER IS CONNECTED DIRECTLY TO GROUND. This WILL DESTROY the Digital PCB and may result personnel injury.

Precautions

- Caution:** Federal (U.S.A.) law restricts this device to sale by or on the order of a physician.
- Caution:** Always inspect the ultrasound probe cap, cover and cable before using it with the Site-Rite IV Scanner. Do not use the probe if the cap is cracked or damaged. Do not allow the probe liquid or liquid vapor to contact the eyes, skin, clothing or room furnishings. The fluid can be irritating to the skin and eyes and may damage furniture finishes. In case of contact, immediately rinse the area with water.
- Caution:** Do not pull the cable to disconnect the probe-connector from the scanner. Pulling the cable may damage the cable, cable connection or scanner.
- Caution:** Do not twist or bend the cable in excess of that required during normal use of the probe. Excessive twisting or bending of the cable may cause failure or intermittent or unpredictable operation.
- Caution:** When disinfecting the probes with a liquid disinfectant, do not soak the probe cable, cable bend relief or probe connector. Doing so may damage the probe.
- Caution:** Hot water (in excess of 113°F or 45°C) may damage the probe.
- Caution:** Do not expose the probe to direct sunlight for an extended period of time. Excessive heat from the sun may damage the probe.
- Caution:** Before you connect the A/C adapter to or disconnect the A/C adapter from the Site-Rite IV Scanner, verify that the A/C adapter is not plugged into a wall socket.
- Caution:** Check the alignment of the 7.5 MHz and 9.0 MHz fluid standoff probes at least once a month, or after a probe has experienced any mechanical impact. Do not use a misaligned probe for needle guidance. For the alignment test, see Chapter 5.5, *Periodic Probe Testing*.
- Caution:** Only apply commercially available ultrasonic couplant, which has been specifically formulated for use in medical applications, to the acoustic window (or face) of the probe. Use water or rubbing alcohol and a soft cloth to remove couplant from the acoustic window (or face) of the probe.
- Caution:** Do not allow ultrasonic couplant to dry on the acoustic window (or face) of the probe. If the couplant should dry, use water or rubbing alcohol and a soft cloth to remove it. Never use a tool of any kind to remove dry couplant from the acoustic window (or face) of the probe.
- Caution:** Some commercially available probe covers contain latex. Natural rubber latex may cause allergic reactions. Refer to the US FDA alert titled: "Medical Alert: Allergic Reactions to Latex-Containing Medical Devices." Bard Access Systems distributes sterile probe covers and needle guide kits that do not contain latex.
- Caution:** Do not force the Probe connector. Damage to the connector and system could result.
- Caution:** Use water or rubbing alcohol and a soft cloth to remove couplant from the acoustic window (or face) of the probe. Failure to do so may scratch the acoustic window.
- Caution:** During disinfection immerse the probe up to, but not including, the colored cable bend relief.
- Caution:** Always snap the needle guides on to the probe hook. Do not slide the needle guide on to the needle guide hook, as the sterile probe cover may tear.
- Caution:** The adverse biological effects of ultrasound on tissue appear to be threshold effects. When tissue is repeatedly exposed to ultrasound, with intervals in between, there will likely be no cumulative biological effect. If, however, a certain threshold has been passed, biological effects may occur. While the Site-Rite IV acoustic output parameters fall well below all FDA thresholds for adverse biological effects, any given Ultrasound Procedure should be performed using the principle of ALARA (As Low As Reasonably Achievable). The licensed medical practitioner should limit the time of patient exposure to ultrasonic radiation using the principle of ALARA.
- Caution:** Only accessories that are approved for use by country and local authorities are to be connected to the Site-Rite IV Scanner. Use of accessories that are not compliant to International Electrical Safety Standards may result in device failure.
- Caution:** Use only Bard Access Systems cleaning and disinfection procedures. Failure to do so may damage the device.

Notes

- Note:** If you are using the A/C adapter, the adapter automatically adjusts to the correct line voltage between 100 - 240 VAC, 50 - 60 Hz. The adapter ships with country-specific wall plugs. Verify that the A/C adapter has the appropriate plug for your country's electrical system.
- Note:** The probe connector can only be inserted in one direction. If the connector does not fit into the probe port, turn the connector over and try again.
- Note:** When in the screens to change the day and time; to discard the changes made to the time and date, press the Freeze Frame button before saving the changes. The date format does not change.
- Note:** When cleaning the system and components, it is important to remove all particles or other matter from all surfaces and crevices.
- Note:** For periodic probe testing, you may use a deeper intersect guide than 1.5 cm, with the 7.5 MHz probe, or a shallower intersect guide, 0.5 cm or 1.0 cm, with the 9.0 MHz probe.
- Note:** When placing a cold battery in a warm room to charge, the rapid temperature change of the battery occasionally causes the Site-Rite Mini Battery Charger to switch from the Rapid Charge mode to Pending Charge mode (within a few minutes of turning on). If this occurs, remove the Site-Rite Mini Battery Charger from the AC power and remove the battery from the molded battery charger connector. Wait a few moments before reconnecting the Site-Rite Mini Battery Charger to AC power and the battery to the molded battery charger connector.
- Note:** Use of the battery packs in low temperatures reduces battery life.

MATERIAL SAFETY DATA

STANDOFF PROBE FLUID

Warning: Contains n-Butyl Phthalate ($C_{16}H_{22}O_4$): Causes eye irritation. May cause skin irritation. Inhalation of high vapor concentrations may be harmful. Avoid contact with eyes, skin, clothing. Avoid breathing vapors. Use with adequate ventilation. Keep container closed. Wash thoroughly after handling. Ingestion of large quantities may cause liver or kidney damage.

Protective Equipment: Wear impervious gloves and eye protection. Provide adequate ventilation.

FIRST AID

Inhalation - Remove from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Keep affected person warm and at rest. Get medical attention.

Skin Contact - Remove contaminated clothing and shoes. Wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (approximately 10 - 20 minutes). Get medical attention if necessary.

Eye Contact - Wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids until no evidence of chemical remains (approximately 15 - 20 minutes). Get medical attention.

Ingestion - If victim is conscious, immediately give 2 to 4 glasses of water and induce vomiting by touching finger to back of throat. Get medical attention immediately.

Supplied to: Bard Access Systems, Salt Lake City, UT 84116 www.bardaccess.com

Phone: (801) 595-0700

Supplied by: Fisher Scientific, 2000 Park Lane, Pittsburgh, PA 15275

Phone: (412) 460-8300

ACRONYMS AND ABBREVIATIONS

The following acronyms and abbreviations are used in this manual:

A	Ampere
AC.....	Alternating Current
AGC.....	Automatic Gain Control
APO	Absolute Position Output
CPU	Central Processing Unit
D/A.....	Digital to Analog
DC	Direct Current
EMC	Electro-Magnetic Compatibility
ESD.....	Electro-Static Discharge
EMI.....	Electro-Magnetic Interference
FAX.....	Facsimile
FIFO	First-In-First-Out
HV	High Voltage
Hz	Hertz
KHz.....	KiloHertz
kPa	kiloPascals
LCA	Logic Cell Array
LCD	Liquid Crystal Display
LED	Light Emitting Diode
No.	Number
PCB.....	Printed Circuit Board
pF.....	picofarads
RAM	Random Access Memory
Ref.	Reference
SODIMM.....	Small Outline Dual Inline Memory Module
SRAM	Static Random Access Memory
TGC.....	Time Gain Control
USA.....	United States of America
VAC	Volts Alternating Current
VDC	Volts Direct Current

SERVICE EQUIPMENT REQUIREMENTS LIST

The scanner manufacturer recommends the following is a list of equipment to successfully service the *Site-Rite IV System* and its accessories. This is the minimum required by the manufacturer. It is recommended that the equipment be calibrated at least once every twelve months.

- Digital Multimeter - Fluke79 (or equivalent)
- Oscilloscope - Hewlett Packard Model 54645D (or equivalent) with two 10X Probes
- 1/4" Drive Socket Wrench Set
- Ignition (Small Combination) Wrench Set
- #1 Phillips Screwdriver
- #2 Phillips Screwdriver
- 1/4" Slotted Screwdriver
- Non-Conductive Alignment Tool
- Needle Nose Pliers
- Diagonal Wire Cutters
- Wire Strippers
- Soldering Iron
- 60/40 Solder
- Solder Wick

SITE~RITE* IV TRANSDUCER ASSEMBLY SERVICING

Note: For purposes of this manual the terms Probe, Probe Assembly, Transducer and Transducer Assembly are used interchangeably.

The *Site~Rite IV Transducer Assemblies* are NOT field serviceable. When it is determined that a transducer assembly is damaged or defective, the transducer assembly MUST be returned to Bard Access Systems for service. Opening, disassembling, modifying or tampering with any transducer assembly will void the warranty.

Bubbles may develop in the transducer assembly fluid. If a bubble becomes large enough to be seen in the scan image, the transducer must be returned to Bard Access Systems for service. Opening, disassembling, modifying or tampering with any transducer assembly will void the warranty.

SITE~RITE* IV SYSTEM DESCRIPTION

Site~Rite IV System has four major components (see Figure 1):

- Power Source (Battery Pack or Alternating Current [AC] Adapter)
- Transducer Assembly
- Scanner Assembly
- *Site~Rite Mini Battery Charger*

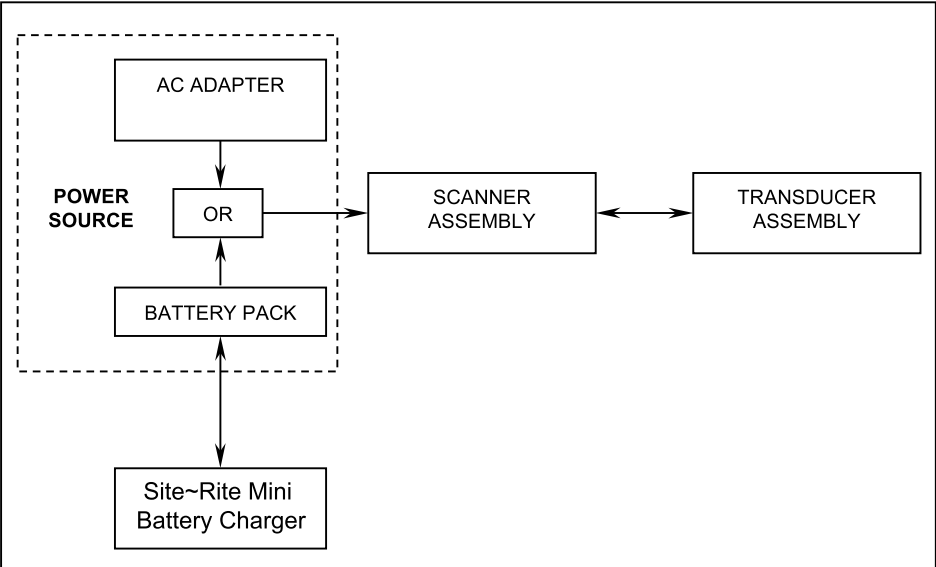


Figure 1 - SITE~RITE* IV System Block Diagram

Power Source

The Power Source supplies +14.4 Volts Direct Current (VDC) (nominal) to the Scanner Assembly. An AC Adapter supplies +15 V Direct Current (VDC) to the Scanner Assembly. Each device snaps onto the rear of the Scanner Assembly. The AC Adapter permits system operation with the unit plugged into a wall outlet. The battery permits portable system operation.

AC Adapter

The AC Adapter provides +15.0VDC (nominal) to the Scanner Assembly. It snaps onto the rear of the Scanner Assembly, occupying the battery position. The adapter is a switching power supply that converts AC line voltage to the Direct Current (DC) voltage required by the system. The United States adapter accepts 110 Volts Alternating Current (VAC) (nominal), 60 Hertz (Hz) power. The European adapter accepts 230VAC (nominal), 50 Hz power.

See *Site-Rite IV Ultrasound System* Specifications for the actual input voltage range.

The AC Adapter is NOT field serviceable. When it is determined that an AC Adapter is defective, the adapter MUST be returned to Bard Access Systems for repair. Opening, disassembling, modifying or tampering with any AC Adapter will void the warranty.

Battery Pack

The Battery Pack (see the drawing on Page B-12) provides +14.4VDC (nominal) to the Scanner Assembly. It snaps onto the rear of the Scanner Assembly like the AC Adapter. The pack, when fully charged, can operate the system for approximately two hours.

The Battery Pack contains 12 nickel-metal hydride cells, connected in series. A resettable poly switch provides over current protection. A Pepi* N-1 thermostat provides over temperature protection. A thermistor attached to the cells provides real-time temperature data to the charger during the charging cycle. The Battery Pack is sealed and cannot be serviced.

Warning: Always properly dispose of dead battery packs in accordance with local regulations. Improper disposal may present an environmental hazard.

Transducer Assembly

The Transducer Assembly has three basic components. These are:

- Piezoelectric Transducer
- Motor
- Housing and Cable Assembly

The transducer converts electrical pulses from the Pulser/Receiver PCB into acoustical pulses. These pulses penetrate the target. Pulse echoes, from the target, return to and strike the crystal transducer. The transducer converts these acoustical echoes to electrical signals. The electrical signals are sent to the Pulser/Receiver PCB.

The transducer is mounted to the rotor of an oscillating motor (see Figure 2). As the rotor oscillates it positions the transducer. At intervals the transducer emits acoustical pulses (see Figure 3).

This establishes the scan sector. Transducer assembly fluid encapsulates the transducer and motor, improving ultrasound signal transmission. All of these components are contained in the transducer assembly housing and connected to the scanner assembly with the cable assembly.

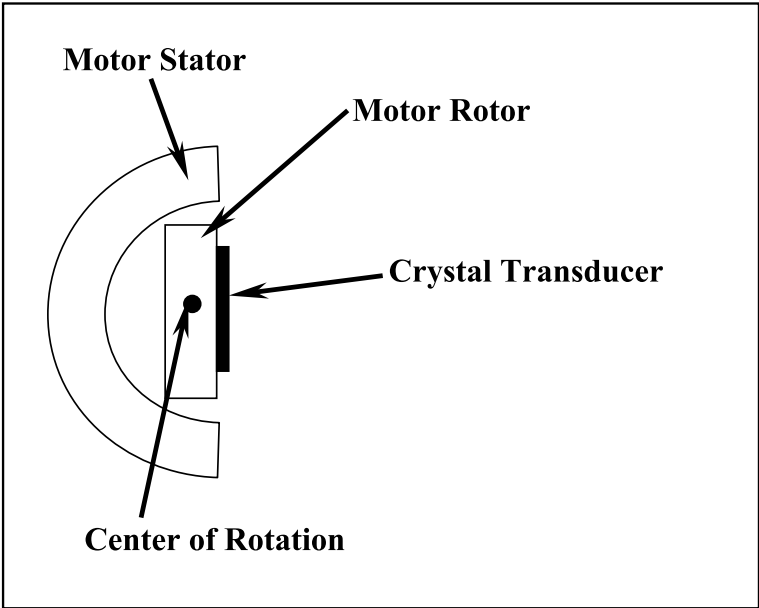


Figure 2 - Motor - Transducer Configuration

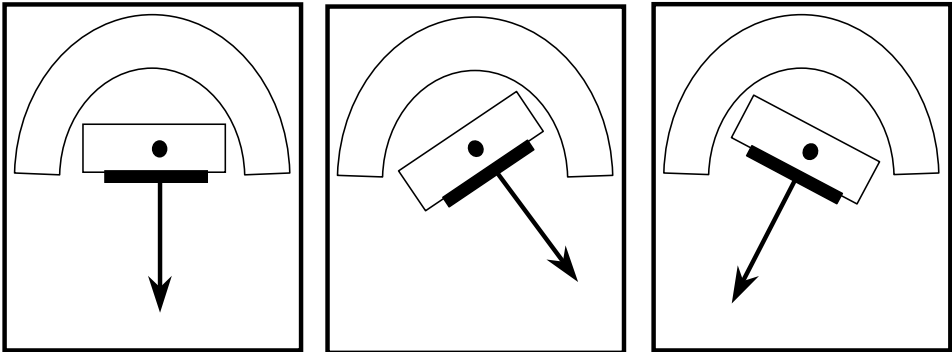


Figure 3 - Transducer Motor Oscillation

Scanner Assembly

The *Site-Rite IV Scanner Assembly* consists of nine major sections (see Figure 4). These include:

- Power Supply Printed Circuit Board (PCB)
- Digital PCB
- Pulser/Receiver PCB
- Servo PCB
- Motherboard
- SODIMM
- User Interface PCB (Button Board)
- LCD PCB
- LCD Assembly

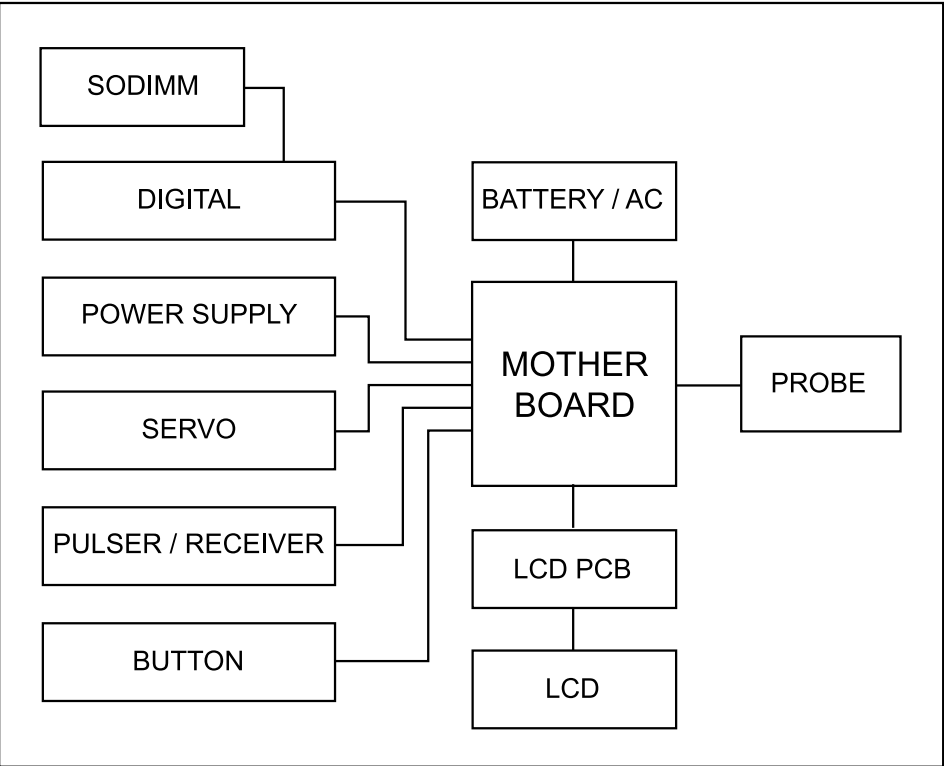


Figure 4 - SITE~RITE* IV Scanner Block Diagram

POWER SUPPLY PCB

The Power Supply PCB (see Figure 5) generates most of the operating voltages required by the system from an external source. The source is either the AC Adapter or the Battery Pack and provides interface between user control (Button Board) and Digital PCB.

The power supply PCB has a microprocessor that monitors button inputs and battery condition. Upon receiving a power button press, the processor will activate the front panel light and relay that governs the power for the rest of the scanner. The processor will also detect other button pushes and communicate accordingly with the digital PCB. Once the low / dead battery sense circuitry has confirmed a change in condition, the processor will be notified and will blink the LED (for low battery) or turn off the relay (for dead battery).

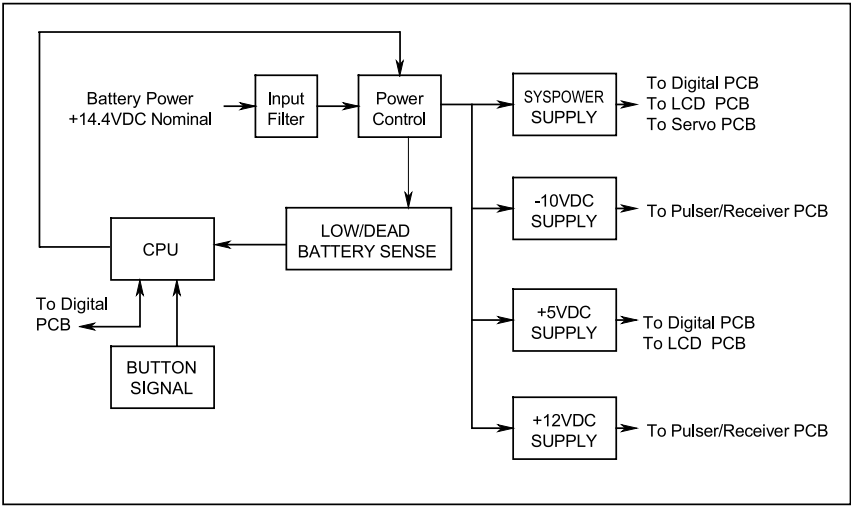


Figure 5 - Power Supply Block Diagram

The Power Source output is connected to the Input Filter where it is Electro-Magnetic Coupling (EMC) and Electro-Static Discharge (ESD) filtered. Additional EMC and Electro-Magnetic Interference (EMI) filtering takes place at the input and output of each section of the power supply.

The Low/Dead Battery Sensing section signals the CPU to flash the Power Button Light Emitting Diode (LED) when the Power Source voltage falls below +13.7VDC. A dead battery system shutdown occurs when the Power Source voltage falls to +12.5VDC.

The -10VDC Supply provides -10VDC for the Pulser/Receiver PCB. This supply uses a charge pump setup. The output of the charge pump is filtered and regulated.

The +5VDC Supply provides +5VDC to the Digital PCB. This supply uses a high efficiency 3Ampere (A) switching regulator.

The +12VDC Supply provides regulated +12VDC to the Pulser/Receiver PCB.

DIGITAL PCB

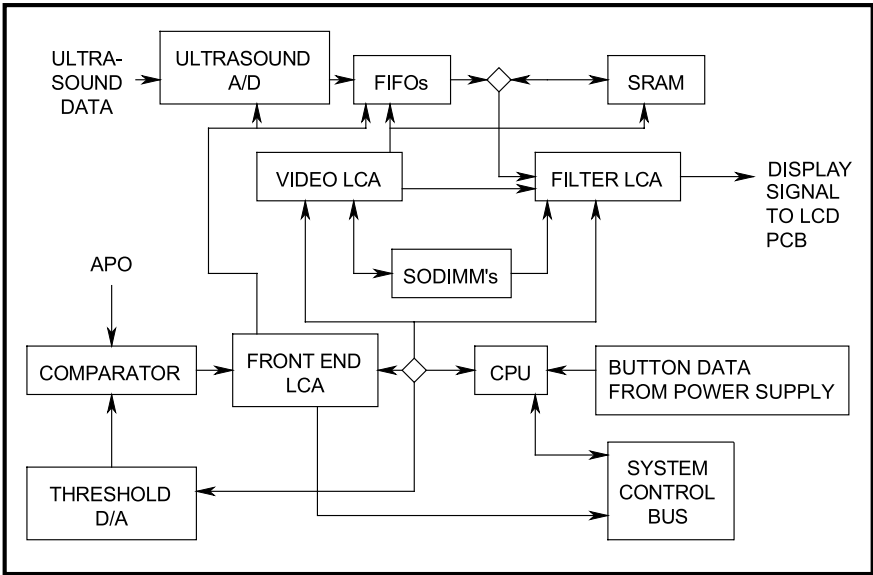


Figure 6 - Digital PCB Flow Chart

Note: The SODIMM's pictured in Figure 6 are located within the SODIMM Module.

The Digital PCB is the core of the *Site~Rite IV Ultrasound System*, controlling and monitoring all aspects of system operation. The system CPU (Central Processing Unit) is located on the Digital PCB.

The CPU performs the following functions. It controls and monitors ultrasound generation, reception, and data acquisition; creates and maintains a one bit deep video overlay plane for the text, icons, and dot markers on the display; and controls the scan converter that uses the acquired ultrasound data to create an ultrasound image.

The Digital PCB also performs some housekeeping duties, adjusts systems operation as directed by the operator through the Buttons PCB and controls three Logic Cell Arrays (LCA's) located on the board. The LCA's perform much of the real work for the CPU.

Front End LCA

The Front End LCA performs two functions:

- Glue logic for the CPU, Random Access Memory (RAM), Flash Memory, etc.
- Performs ultrasound data acquisition

Transducer motion initiates the ultrasound data acquisition sequence. The threshold voltage in the Threshold Digital to Analog Converter (D/A) is compared to the transducer position signal voltage, or Absolute Position Output (APO). When APO voltage crosses the threshold voltage the data acquisition sequence is triggered. The ultrasound data acquisition sequence contains the following events:

- 1 The Pulser is fired, generating an ultrasound pulse.
- 2 A new threshold is established.
- 3 The Pulser is recharged.
- 4 The receiver is activated.
- 5 Time Gain Compensation (TGC) circuits are swept through their sequence.
- 6 The Ultrasound A/D and the First-In-First-Out (FIFO) memories are clocked to acquire the data.
- 7 The receiver is deactivated.

Video LCA

The Video LCA generates the video timing, based on the SODIMM data, and moves the ultrasound data from the FIFO's into the Static Random Access Memory (SRAM) and moves the SRAM data to the Filter LCA, as needed. The SRAM's store the ultrasound data currently displayed by the video output stream.

Filter LCA

The Filter LCA performs a two dimensional interpolation to convert the ultrasound data to pixel data in the video stream. This is necessary because the ultrasound data is formatted in polar coordinates while the pixels are formatted in Cartesian coordinates. The interpolation coefficients are stored in the half of the SODIMM's that is connected to the Filter LCA. It also performs the required calculations to add the overlay to the video signal, as well as the sync and blanking levels. These activities are controlled by the Video LCA and the timing data contained in the SODIMM's.

PULSER/RECEIVER PCB

The Pulser/Receiver PCB (see Figure 7) generates, receives and conditions the ultrasound pulse prior to digitization and display. This PCB contains 11 sections. The ultrasound pulse is produced when the Pulse Generator applies a drive signal to the transducer. This pulse travels through the target medium, causing return echoes of varying intensity. The density of the target medium determines the intensity of the echoes. The transducer receives the echo and sends the pulse to the Amplification and Impedance Matching section. The pulse passes through several stages of amplification and filtering where CPU-controlled modification of the various pulse parameters (overall gain, Time Gain Control [TGC], far field gain and baseline) is accomplished. The pulse passes through detection/rectification and is again amplified. During the last stage of amplification, edge enhancement and low frequency gain are applied, based on the specific Transducer Assembly connected to the system. The pulse is finally sent to the Digital PCB for digitizing.

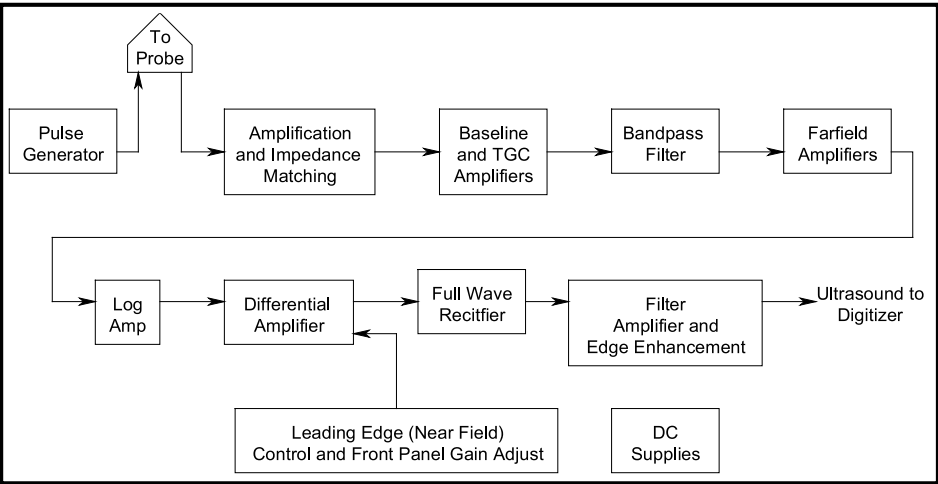


Figure 7 - Pulser/Receiver PCB Flow Chart

SERVO PCB

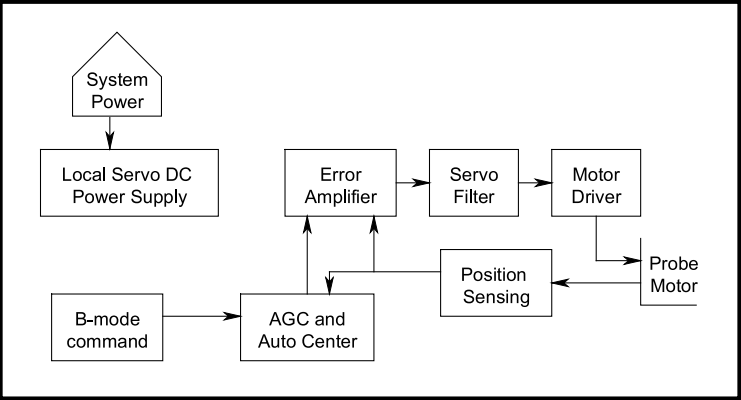


Figure 8 - Servo PCB Flow Chart

The servo control circuit provides motor drive power for the transducer assembly and receives the position sensing signals from the transducer assembly. The circuit generates required voltages locally from switched, filtered system power. The circuit provides probe auto zero and soft start at power up.

The output of the B-Mode Command generator is a round peak triangle wave with symmetrical positive and negative peaks. The amplitude and frequency of the command waveform are both adjustable. B-Mode Command is generated and supplied to the Automatic Gain Control (AGC) and Auto Center Circuitry. The auto center circuitry forces the transducer to the 0° position on startup and controls the time required for the transducer to reach full motion (typically 1 to 3 seconds). AGC ensures that the commanded scan angle is symmetrical. Using zero crossing detection, feedback from the Position Sensing circuitry is combined with the B-Mode Command and sent to the Error Amplifier circuitry to provide position and drive level correction to the motor drive circuitry through a filtering circuit. Transducer motor current is monitored to prevent and notify the operator of an over current condition.

SODIMM MODULE

The SODIMM Module contains non-volatile memory devices. They store interpolation coefficients (weights) and control data for the filter and video LCA's. Module capacity allows the display of any of the four discreet shapes on the screen.

BUTTON PCB

The Button PCB is used to create the user interface. A 20-conductor flat ribbon cable connects the Button PCB to the Mother Board. The button and LED signals are transmitted through the Mother Board to the Power Supply Board where the Microcontroller monitors the buttons and controls the LED. The board consists of nine contact areas where the conductive “pills” on the back of the rubber buttons touch to complete the appropriate circuit when a button is pushed. A LED in the PCB is illuminated during normal scanner operation. That same LED is flashed slowly to indicate a low battery condition. It is also used to blink out error messages when needed.

LCD PCB

The Liquid Crystal Display (LCD) PCB is an interface between the Digital PCB, which generates the digital data signal that will become the image data, and the LCD screen. The LCD PCB controls the LCD backlight via one digital and one analog signal from the Digital PCB. The LCD PCB also acts as a mount for the LCD screen, which is attached to the LCD PCB. The LCD PCB is attached to the motherboard PCB via a 40-conductor flat ribbon cable.

SITE-RITE IV CONTROLS AND INDICATORS

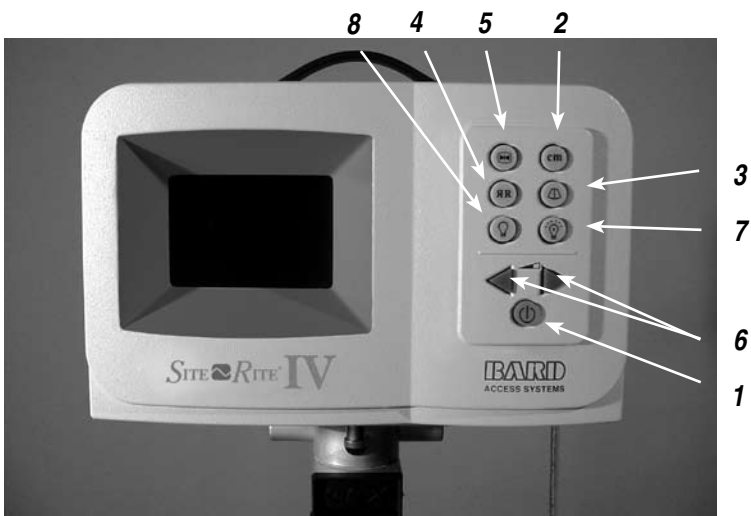


Figure 9 - Scanner Assembly Front Panel

Scanner Assembly Controls

The following controls are located on the front of the Scanner Assembly:

- 1 **Power Button** - This illuminated button applies (ON) power to and removes (OFF) power from the system. The button lights when the switch is ON. A transducer assembly must be connected to the system to enable the switch.
- 2 **Depth Selection Button** - This button enabled only during real time imaging, selects the scan depth to be displayed. The transducer assembly connected to the scanner assembly determines the available depth options.
- 3 **Center Dot Marker Button** - This button enables (ON) or disables (OFF) the Center Dot Marker function. The default is Center Dot Marker OFF.
- 4 **Image Reversal Button** - This button enabled only during real time imaging, reverses the scan image orientation horizontally.
- 5 **Freeze Button** - This button disables (FREEZE) or enables (ON) real time imaging. The default is real time imaging ON.
- 6 **Gain Control Buttons** - These buttons enabled only during real time imaging, increases or decreases the intensity of the scan image.
- 7 **Brightness Increase** - This buttons increases the LCD brightness.
- 8 **Brightness Decrease** - This buttons decreases the LCD brightness.

Scanner Assembly Indicators

There are two indicators on the Scanner Assembly. They are:

- Power Button Lamp - The Power Button Lamp lights when the switch is ON.
- LCD Display - The following information may be displayed on the LCD Display:
 - Selected Depth
 - Transducer Assembly Frequency
 - Selected Image (Normal or Reversed)
 - Date and Time
 - Freeze Symbol
 - Center Dot Markers
 - Selected Gain Level

TROUBLESHOOTING

This table will help the repair technician isolate problems and failures exhibited by the *Site~Rite IV Ultrasound System*. System repair is limited to module replacement. The Power Supply PCB, the Digital PCB, the Button PCB, the Pulser/Receiver PCB and the Interconnect PCB are field replaceable. When failures are isolated to the Servo/Monitor PCB, CRT Socket PCB or CRT Assembly, the system must be returned to Bard Access Systems for repair. This table is not all-inclusive. For any problem not covered by the Troubleshooting Guide or to arrange a return contact Bard Access Systems Technical Support at: (800) 443-3385

TROUBLESHOOTING GUIDE		
Problem	Possible Causes	Solution
The system does not energize (the Power Button LED does not light, the power supply relay doesn't energize and there is no display).	The Battery Pack is discharged.	Remove the Battery Pack. Measure the voltage between Pin 1 (+) and Pin 2 (Ground) of the Battery Pack. If the measured voltage is less than +12.5VDC, recharge the Battery Pack.
	The Battery Pack is defective.	Replace the Battery Pack.
	The Battery Pack is not properly installed.	Properly install the Battery Pack.
	The Motherboard PCB is defective.	Measure the voltage between TP13 and Ground. If the measured voltage is not +14.4VDC (Nominal), replace the Motherboard PCB.
	The Power Supply PCB is defective.	Measure the voltage TP1 and ground. If the measured voltage is not +3.6VDC, replace the Power Supply PCB.

TROUBLESHOOTING GUIDE (Continued)		
Problem	Possible Causes	Solution
The system does not energize (the Power Button LED does not light, the power supply relay doesn't energize and there is no display).	The Power Supply PCB fuse is open.	Replace the Power Supply PCB fuse.
The system does not energize (the Power Button LED does light, the power supply relay energizes and there is no display).	The Power Supply PCB is defective.	Measure the voltage between TP5 and Ground on the Power Supply PCB. If the measured voltage is not +5VDC, replace the Power Supply PCB.
	The Digital PCB is defective.	Try to use a known good Digital PCB. If problem ceases, replace the Digital PCB.
	The LCD PCB is defective.	Try to use a known good LCD PCB. If problem ceases, replace the LCD PCB.
The Power Button LED lights and the Transducer Assembly oscillates, but the display is off.	The Digital PCB is defective.	Try to use a known good Digital PCB. If problem ceases, replace the Digital PCB.
	The LCD PCB is defective.	Try to use a known good LCD PCB. If problem ceases, replace the LCD PCB.
The Power Button LED lights, the Transducer Assembly oscillates, the display shows text but no ultrasound image and no error messages are displayed on the LCD.	The Transducer Assembly is improperly connected.	Properly connect the Transducer Assembly.
	The Transducer Assembly is defective.	Replace the Transducer Assembly with a known good assembly.
	The Power Supply PCB is defective.	Measure the voltages TP3 and ground and between TP10 and ground. If the measured voltages are not +12VDC on TP3 and -10VDC on TP10, replace the Power Supply PCB.
	The Digital PCB is defective.	With the Transducer Assembly and Power Supply PCB eliminated, replace the Digital PCB.

TROUBLESHOOTING GUIDE (Continued)		
Problem	Possible Causes	Solution
The Power Button LED lights, the Transducer Assembly oscillates, the display shows text but no ultra-sound image and no error messages are displayed on the LCD.	The Pulser/Receiver PCB is defective.	With the Digital PCB eliminated, replace the Pulser/Receiver PCB.
During normal operation the system shuts down without warning.	Defective low battery detection circuits.	Connect a variable DC Power Supply set to +14.4VDC between Battery Connector Pin 1 (+) and Pin 2 (ground). Monitor the voltage between TP2 and ground. Decrease the power supply voltage. As the power supply voltage reaches +13.5VDC the voltage at TP2 drops to +13.5VDC. At approximately +13.5VDC, the front panel LED should start blinking. If the LED does not blink, or the unit shuts off automatically, the power supply PCB is defective
The Transducer Assembly produces a knocking sound.	The Transducer Assembly or transducer control is defective.	Replace the Transducer Assembly with a known good assembly. If this corrects the problem, return the Transducer Assembly to Bard Access Systems for repair. If the problem persists, the Servo PCB is defective. Return the system to Bard Access Systems for repair.
The Power Button LED lights, the Transducer Assembly oscillates, the display shows text but no ultra-sound image and a Sync Timeout error message is displayed on the LCD.	The Transducer Assembly is improperly connected.	Properly connect the Transducer Assembly.
	The Transducer Assembly is defective.	Replace the Transducer Assembly with a known good assembly.

TROUBLESHOOTING GUIDE (Continued)		
Problem	Possible Causes	Solution
The Power Button LED lights, the Transducer Assembly oscillates, the display shows text but no ultra-sound image and a Sync Timeout error message is displayed on the LCD.	The Digital PCB is defective.	Attempt to use a known good Digital PCB. If problem ceases, replace Digital PCB
	The Servo PCB is defective.	Attempt to use a known good Servo PCB. If problem ceases, replace Servo PCB.
The system functions normally, but the Gain Buttons are all disabled.	System is in the Freeze Mode.	Press the Freeze Button.
	The Button PCB is defective.	With mode and operation errors eliminated, replace the Button PCB.
The Power Button LED lights, the Transducer Assembly does not oscillate, the display shows text but no ultrasound image and no error messages are displayed on the LCD.	The Transducer Assembly is defective.	Replace the Transducer Assembly with a known good assembly.
	The Power Supply PCB is defective.	Measure the voltages TP3 and ground and between TP10 and ground. If the measured voltages are not +12VDC on TP3 and -10VDC on TP10, replace the Power Supply PCB.
	The Digital PCB is defective.	With the Transducer Assembly and Power Supply PCB eliminated, replace the Digital PCB.
	The Pulser/Receiver PCB is defective.	With the Digital PCB eliminated, replace the Pulser/Receiver PCB.
The Power Button LED lights, the ultrasound are of the display shows concentric circles	The Transducer Assembly is defective.	Replace the Transducer Assembly with a known good assembly.
The Power Button LED lights, the display is normal and the Transducer Assembly oscillates, but the operator controls are disabled.	Serial communication between the Power Supply PCB and the Digital PCB is defective.	Measure the voltage between TP15 and ground while depressing a button. If the Serial Stream is present, replace the Digital PCB. If the Serial Stream is not present when a button is depressed, replace the Power Supply PCB.
Image quality is poor or penetration is inadequate.	The Transducer Assembly is defective.	Replace the Transducer Assembly with a known good assembly.
	The Pulser/Receiver PCB is defective.	Replace the Pulser/Receiver PCB.
	Insufficient quantity of acoustic coupling gel used.	Add additional acoustic coupling gel.

COMMON PROBLEMS AND SOLUTIONS		
Problem	Possible Causes	Solution
Scanner does not turn on.	Battery pack is depleted.	Remove battery pack and replace with a fully charged battery pack.
	Battery pack or A/C adaptor not properly connected to scanner.	Verify that power source is firmly connected to back of scanner.
	Probe not properly connected or not connected at all.	Verify that probe is properly connected to scanner.
	Probe damaged.	Attach different <i>Site~Rite IV Probe</i> and power on. If scanner functions, return probe for repair. If scanner does not function, return scanner for repair.
	A/C adaptor is not properly attached to an outlet.	Verify that the A/C adaptor is properly attached to a functional outlet.
	The Battery Pack is defective.	Replace the Battery Pack.
Scanner turns on for a moment, then shuts off.	Battery pack is depleted.	Remove battery pack and replace with a fully charged battery pack.
Scanner halts, stutters, then restarts.	Operator may be applying too much pressure on the probe cap, thereby affecting operation of the internal bearings.	Do not press on the sides of the probe cap. Hold probe by the handle.
Scanner turns on, screen lights up, but no image displays.	Probe is too cold.	Wait for probe to warm up.
	Probe is damaged.	Return probe for repair.
	The Probe Assembly is not connected or connected improperly.	Properly connect the Probe Assembly.
Scanner turns on, display is normal shaped, and the internal Probe Assembly does not oscillate.	The Probe Assembly is defective.	Replace the Probe Assembly with a known functioning assembly. Return the probe for repair.
Scanner turns on, screen lights up, text is displayed but no image displays and a Sync Timeout error message is displayed on the screen.	The Probe Assembly is not connected or connected improperly.	Properly connect the Probe Assembly.
	The Probe Assembly is defective.	Replace the Probe Assembly with a known functioning assembly. Return the probe for repair.
Battery pack does not remain attached to scanner.	Clips on battery pack are not in the bracket holes on the back of scanner.	Reconnect battery pack.
	Battery pack is broken.	Return battery pack for repair.

COMMON PROBLEMS AND SOLUTIONS		
Problem	Possible Causes	Solution
Artifacts display throughout image.	Nearby electrical interference.	Change location of scanner, or turn off interfering device.
System functions normally, but the display wobbles or flickers.	The Probe Assembly is located too close to the monitor.	Relocate the Probe Assembly.
Poor or incomplete image displayed.	Inadequate acoustic coupling between probe and sterile sheath or probe and skin.	Add more acoustic gel between probe and sterile sheath or probe and skin.
	Fold or seam overlays the acoustic window of probe.	Smooth out sheath over acoustic window.
Probe makes knocking sound.	Probe is damaged.	Return probe for repair.
System functions normally, but the Gain Control is not functioning	System is in the Freeze Mode.	Press the Freeze Button.
Probe has bubbles.	Probe is damaged.	Return probe for repair.
Image quality is poor or ultrasound beam inadequately penetrates.	Insufficient quantity of acoustic coupling gel used.	Add additional acoustic coupling gel.
During normal operation the scanner shuts down without warning.	The low battery detection circuits are defective.	Remove battery pack and replace with fully charged battery pack.Return scanner for repair.

SITE~RITE* IV ERROR MESSAGES		
Problem	Possible Causes	Solution
Invalid Probe No Probe Invalid Depth	The system cannot identify the probe attached to the scanner.	Turn scanner off. Verify that probe is connected correctly, and then power scanner on. If message repeats: Contact Bard Access Systems Technical Support at (800) 443-3385, your local distributor or EEA Representative.
Probe over power error	The probe attached to the scanner is not oscillating correctly.	Turn scanner off. If probe is cold, warm probe to room temperature by immersing the cap in a cup of warm water. Verify that the probe is connected correctly, and then power scanner on. If message repeats: Contact Bard Access Systems Technical Support at (800) 443-3385, your local distributor or EEA Representative.
LCD thermal shutdown imminent	System is overheated.	Turn scanner off. Allow system to return to room temperature and then power system on. If message repeats: Contact Bard Access Systems Technical Support at (800) 443-3385, your local distributor or EEA Representative.
CRC error	The software running the system is damaged.	Contact Bard Access Systems Technical Support at (800) 443-3385, your local distributor or EEA Representative.
Watchdog time out	The system hardware or software has failed.	Contact Bard Access Systems Technical Support at (800) 443-3385, your local distributor or EEA Representative.
Sync timeout	Various.	Turn scanner off. If probe is cold, warm probe to room temperature by immersing the cap in a cup of warm water. Verify that the probe is connected correctly, and then power scanner on. If message repeats: Contact Bard Access Systems Technical Support at (800) 443-3385, your local distributor or EEA Representative.
Other Error Messages	Various.	Contact Bard Access Systems Technical Support at (800) 443-3385, your local distributor or EEA Representative.

SITE~RITE^{*} IV MODULE REMOVAL AND INSTALLATION

Warning: Only qualified personnel should attempt to service this equipment. The Site~Rite IV contains static sensitive components and circuits. Failure to observe proper static control procedures may damage the system.

Warning: The *Site~Rite IV Ultrasound System* contains dangerous voltages. Service attempts by unqualified personnel may result in serious injury or death.

Scanner Assembly Case Removal and Installation Procedure

1. Position the Power Button to OFF.
2. Remove the Power Source.
3. Remove the two screws located on the rear of the Scanner Assembly.
4. Remove the four handle screws located on the top of the Scanner Assembly.
5. Carefully position the unit upside down.
6. Remove the six screws located on the bottom of the unit.
7. Carefully position the unit rightside up.
8. Being careful not to snag wires or boards, slide the case to the rear until it stops.
9. Carefully position the unit on its side.
10. Disconnect the ground lead.
11. Carefully position the unit rightside up.
12. Remove the case.
13. Reverse Steps 3 through 11 to install the Scanner Assembly case.

SPECIFICATIONS

Storage and Operating Conditions for the *Site~Rite IV Ultrasound System*.

Storage Temperature: 41°F (5°C) to 113°F (45°C)

Operating Temperature: 59°F (15°C) to 100°F (38°C) or 80°F (26.7°C)

Storage and Operating Humidity: 5% to 95% Relative Humidity (non-condensing)

Storage and Operating Atmospheric Pressure: -500 feet elevation (103kiloPascals[kPa])
to 10,000 feet elevation (70kPa)

SITE~RITE^{} IV Scanner Assembly Specifications*

Dimensions: 10" x 6.75" x 8" (540 in³)

Weight: 6.2 lbs. (2.8 kg)

Power Sources: AC Adapter, DC Battery Pack

Power Consumption: 14.4 VDC @ 1.5A

Monitor Size: 3.8"

Transducer Assemblies: 7.5 MHz and 9.0 MHz

SITE~RITE^{} IV AC Adapter Specifications*

Dimensions: 5.0" (12.7 cm) W x 4.25" (10.8 cm) H x 1.75" (4.5 cm) L
Weight: 1.4 lbs. (0.64 kg)
Input Voltage: 100 - 240 VAC (50-60 Hz), 1.0 amp
Output Voltage: 15 VDC (nominal)

SITE~RITE^{} IV DC Battery Pack Specifications*

Dimensions: 5.0" (12.7 cm) W x 4.25" (10.8 cm) H x 1.75" (4.5 cm) L
Weight: 1.9 lbs. (0.86 kg)
Battery Type: Nickel-Metal Hydride
Output Voltage: 14.4 VDC (nominal)
Duration of *Site~Rite IV Ultrasound System* Operation (with fully charged Battery Pack): 2 hours

CHARGE~RITE^{} Battery Charger Specification*

Dimensions: 8.0" (20.3 cm) W x 4.7" (11.9 cm) H x 6.4" (16.3 cm) L
Weight: 3.2 lbs. (1.5 kg)
Approximate Time for 85% Battery Recharge: 2.5 hours
Power Source: 90 - 264 VAC, 47 - 63 Hz, 1.0 amp

SITE~RITE^{} Mini Battery Charger Specifications*

Dimensions: 2.2" (55mm) W x 1.7" (43mm) H x 3.2" (80mm) L
Weight: 0.450 Lbs. (0.204 kg)
Approximate Time for 85% Battery Recharge: 2.5 hours
Power Source: 100 - 250 VAC, 50 - 60 Hz, 1.0 amp
IEC 60601- 1: Class II, Continuous Operation, Not Category AP or APG Equipment, Not protected against ingress of water.
US Part Number: NX1210MU6DBNN
EU Part Number: NX1210ME6DBNN

TRANSDUCER ASSEMBLY SPECIFICATIONS

9.0MHz Transducer Assembly

Ultrasonic Frequency: 9.0 MHz
Sector Angle: 26°
Crystal to Cap Standoff Distance: 4.0 cm
Scan Depth from Transducer Assembly Cap: 2.0 / 4.0 cm
Frame Rate: 24 frames per second
Line Density: 129 lines per frame
Focal Length: 0.5 cm from Transducer Assembly Cap
Focal Zone: 0.0 to 1.5cm from Transducer Assembly Cap

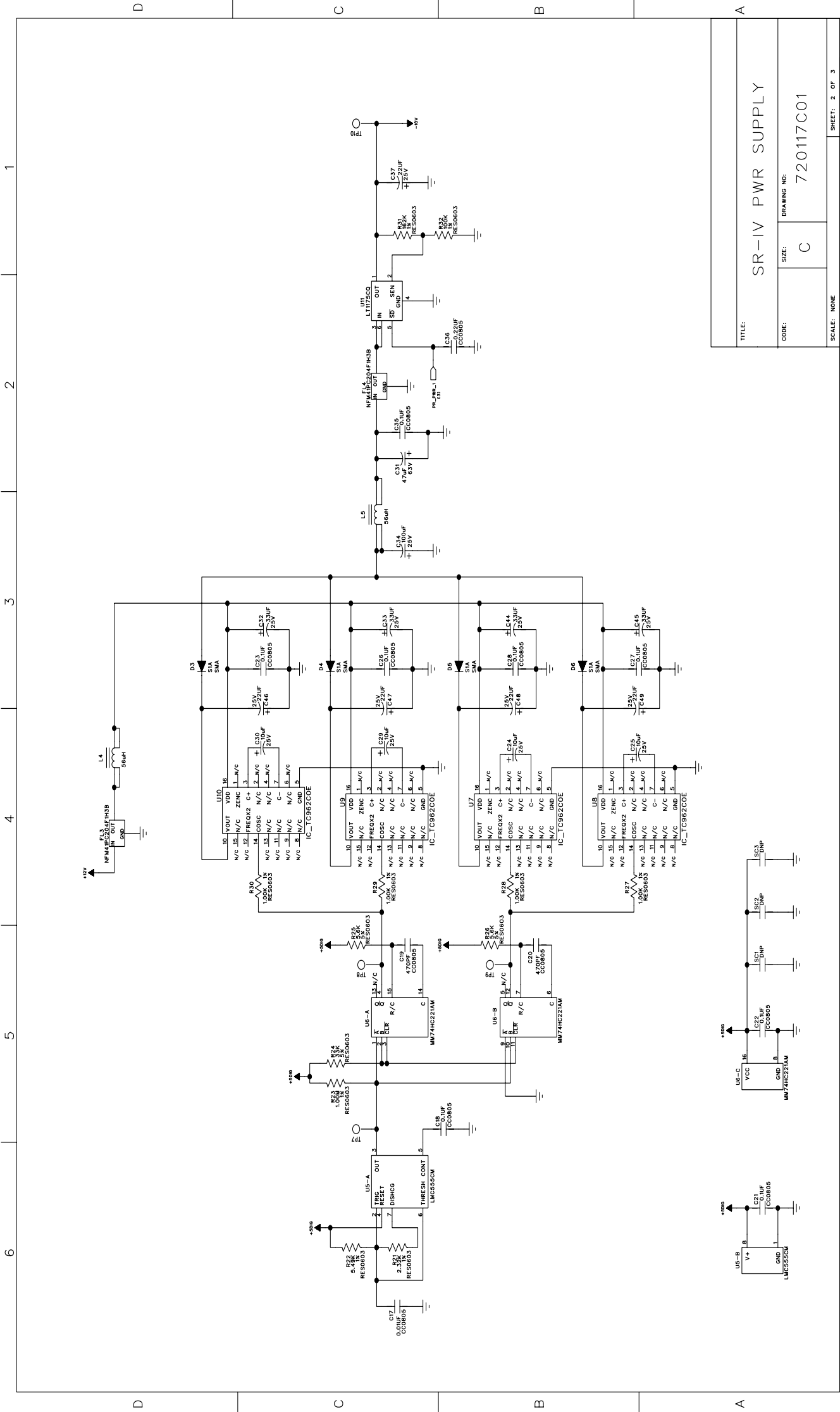
7.5MHz Transducer Assembly

Ultrasonic Frequency: 7.5 MHz
Sector Angle: 26°
Crystal to Cap Standoff Distance: 4.0 cm
Scan Depth from Transducer Assembly Cap: 2.0 / 4.0 cm
Frame Rate: 24 frames per second
Line Density: 129 lines per frame
Focal Length: 2.0 cm from Transducer Assembly Cap
Focal Zone: 1.0 to 4.0cm from Transducer Assembly Cap

APPENDIX

Appendix A - Printed Circuit Board Schematic Drawings

Printed Circuit Board Name	PCB Part Number	Page Number
Motherboard PCB	700110C01	17 - 21
LCD PCB	700115B01	22
Power Supply PCB	700117C01	23 - 25
Digital PCB	700118C01	26 - 34
Pulser/Receiver PCB	700119C01	35 - 37
Servo PCB	700120C01	38 - 44
Button PCB	700121B01	45
SODIMM Module	700122C01 <small>*Call Bard Access Systems for ordering information.</small>	46 - 48



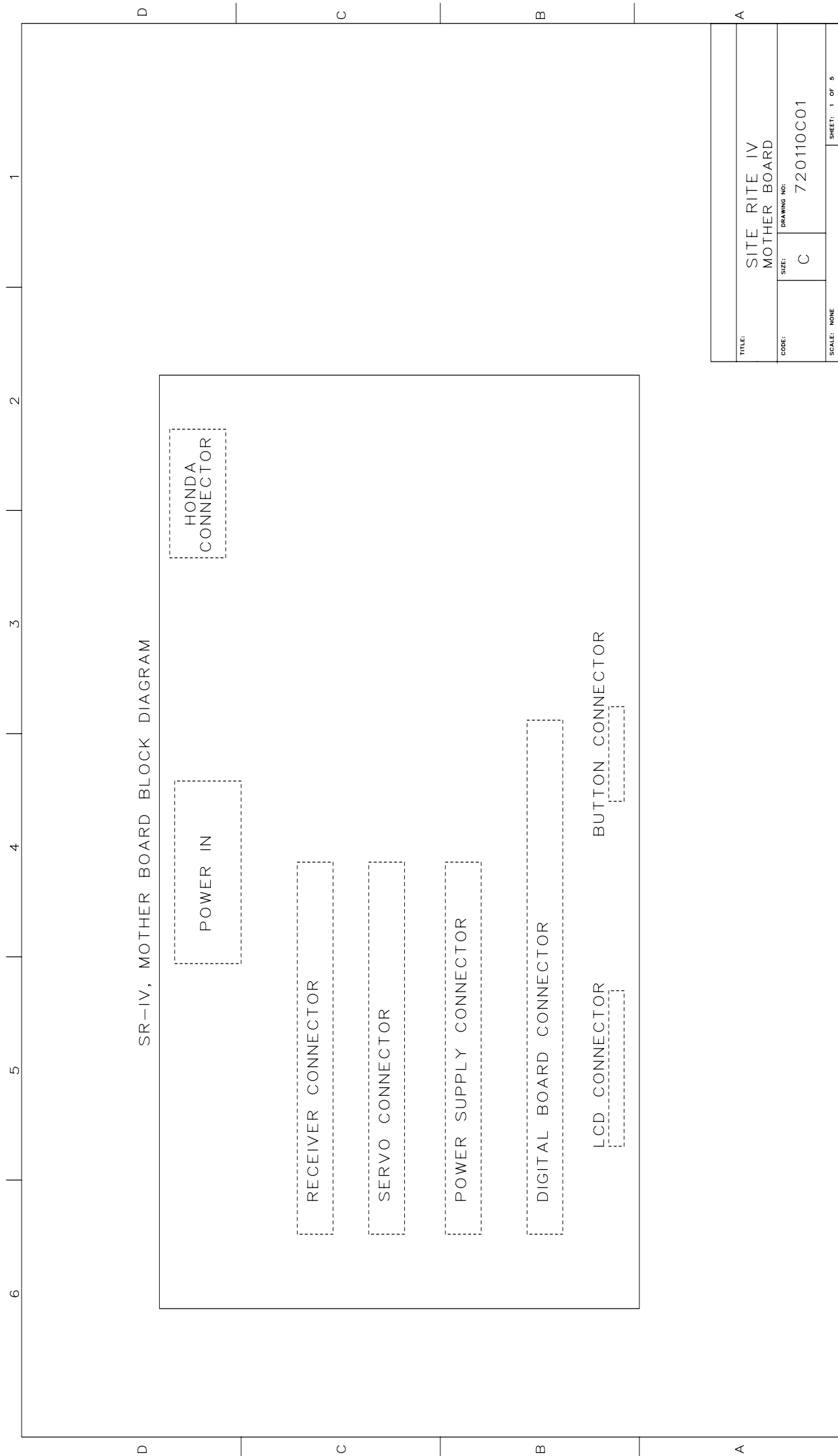
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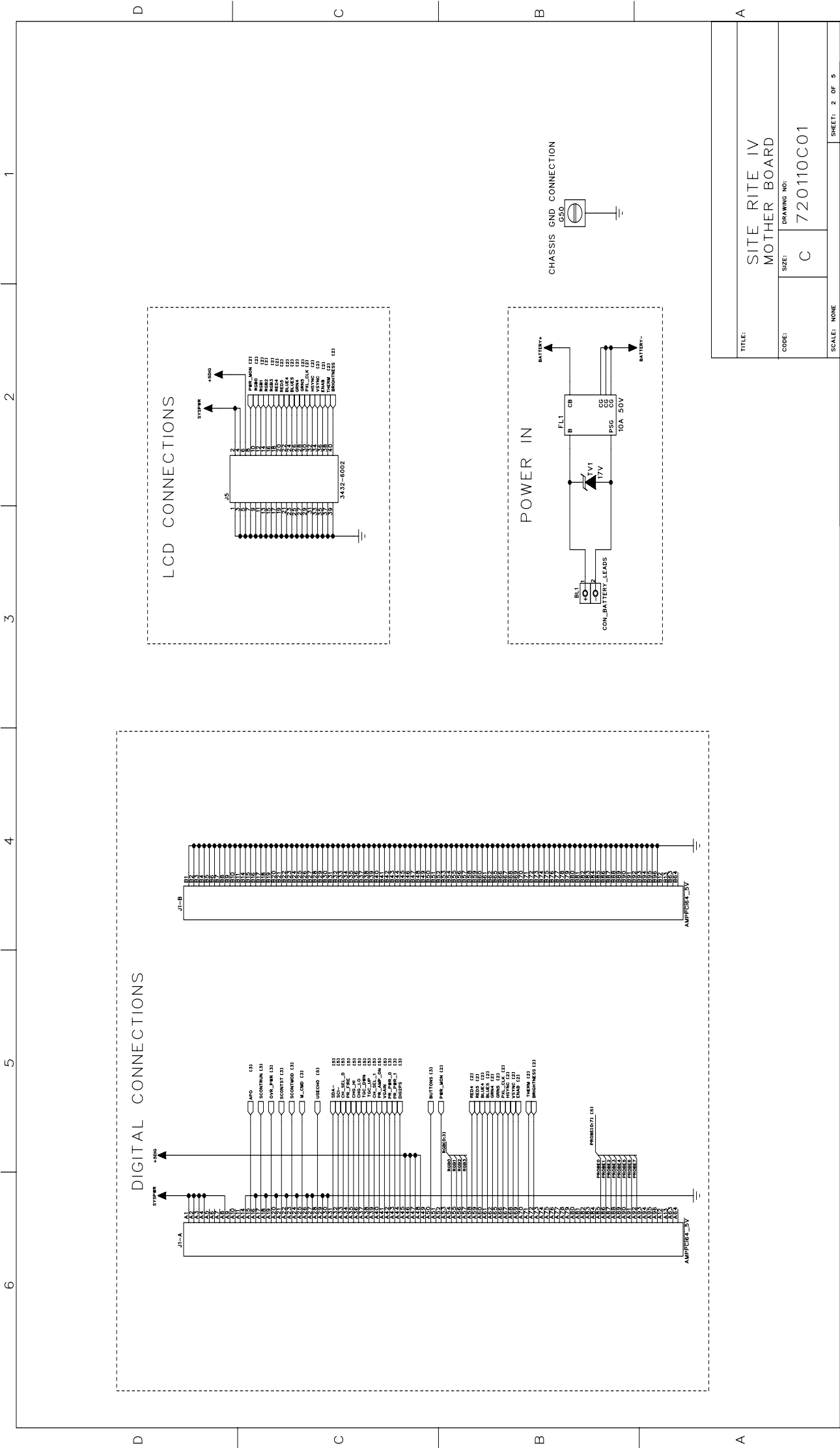
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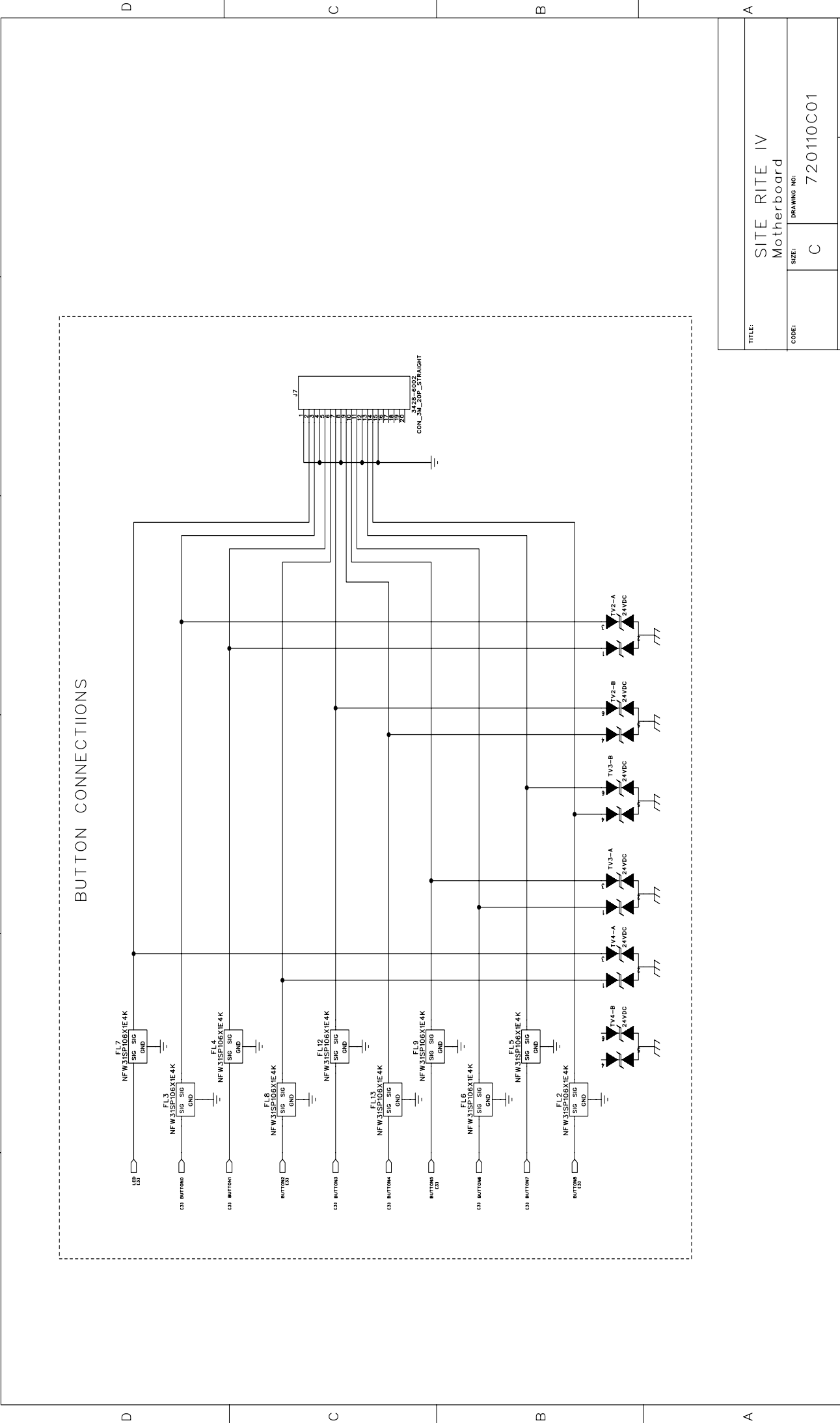
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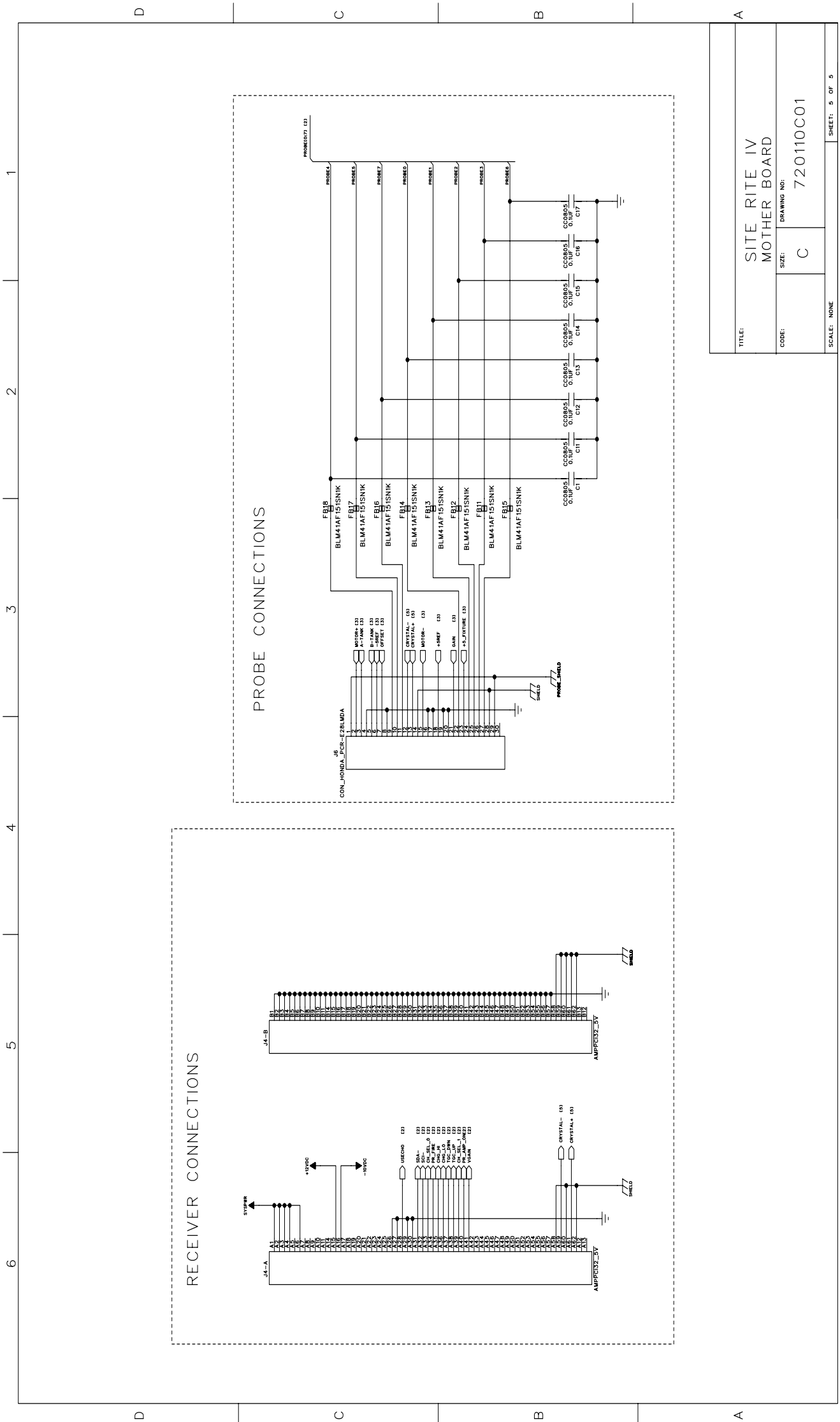
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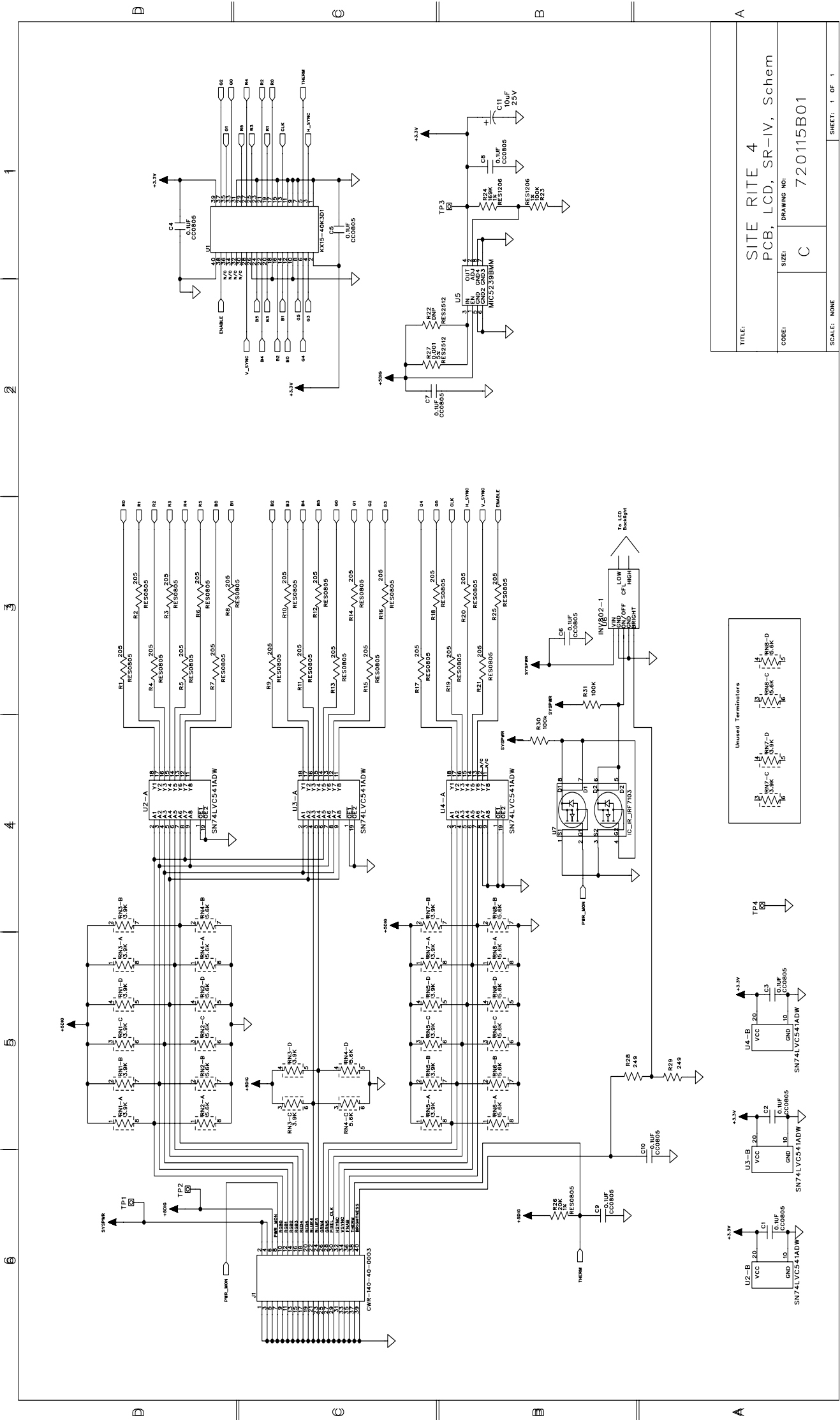


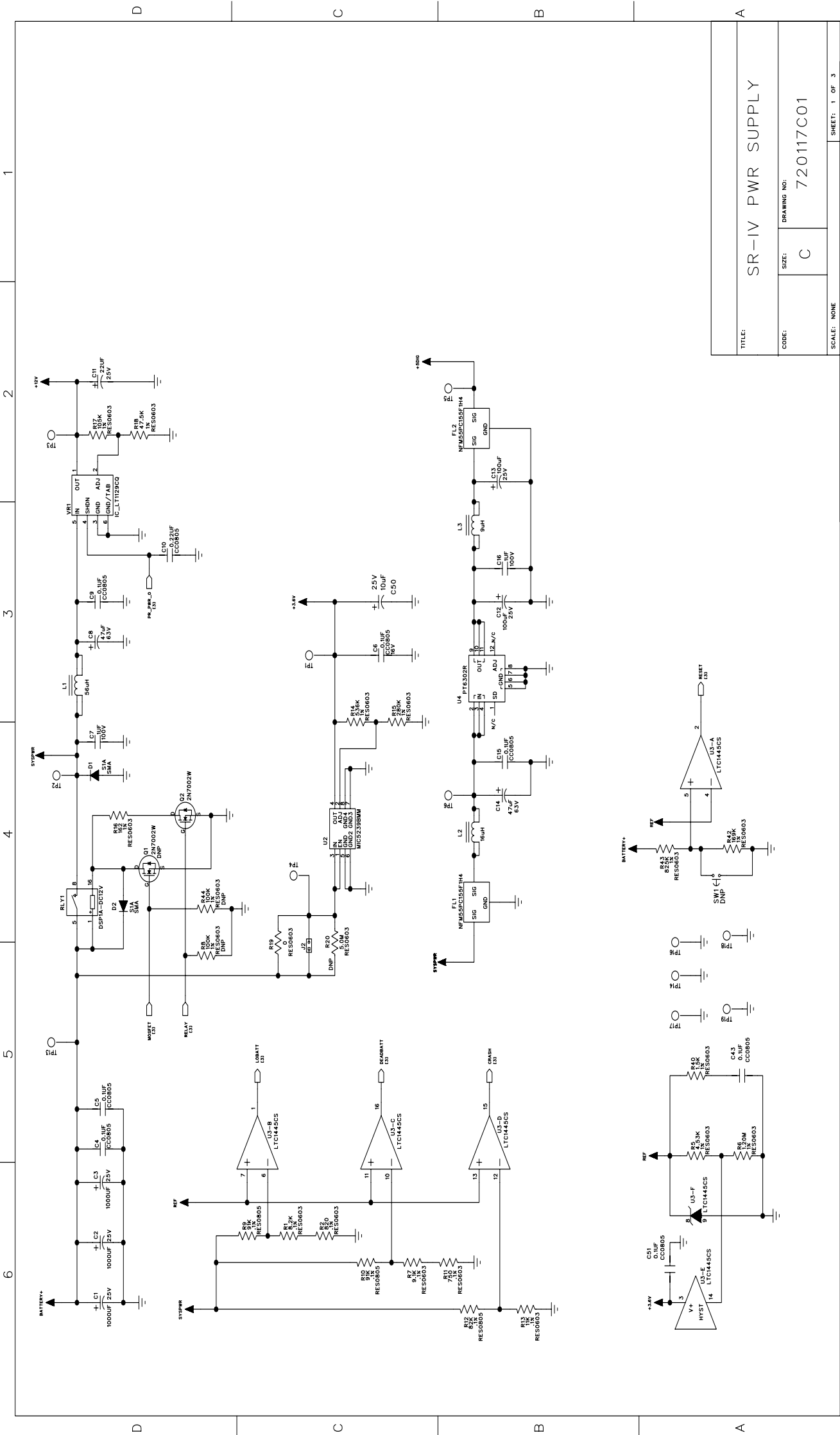


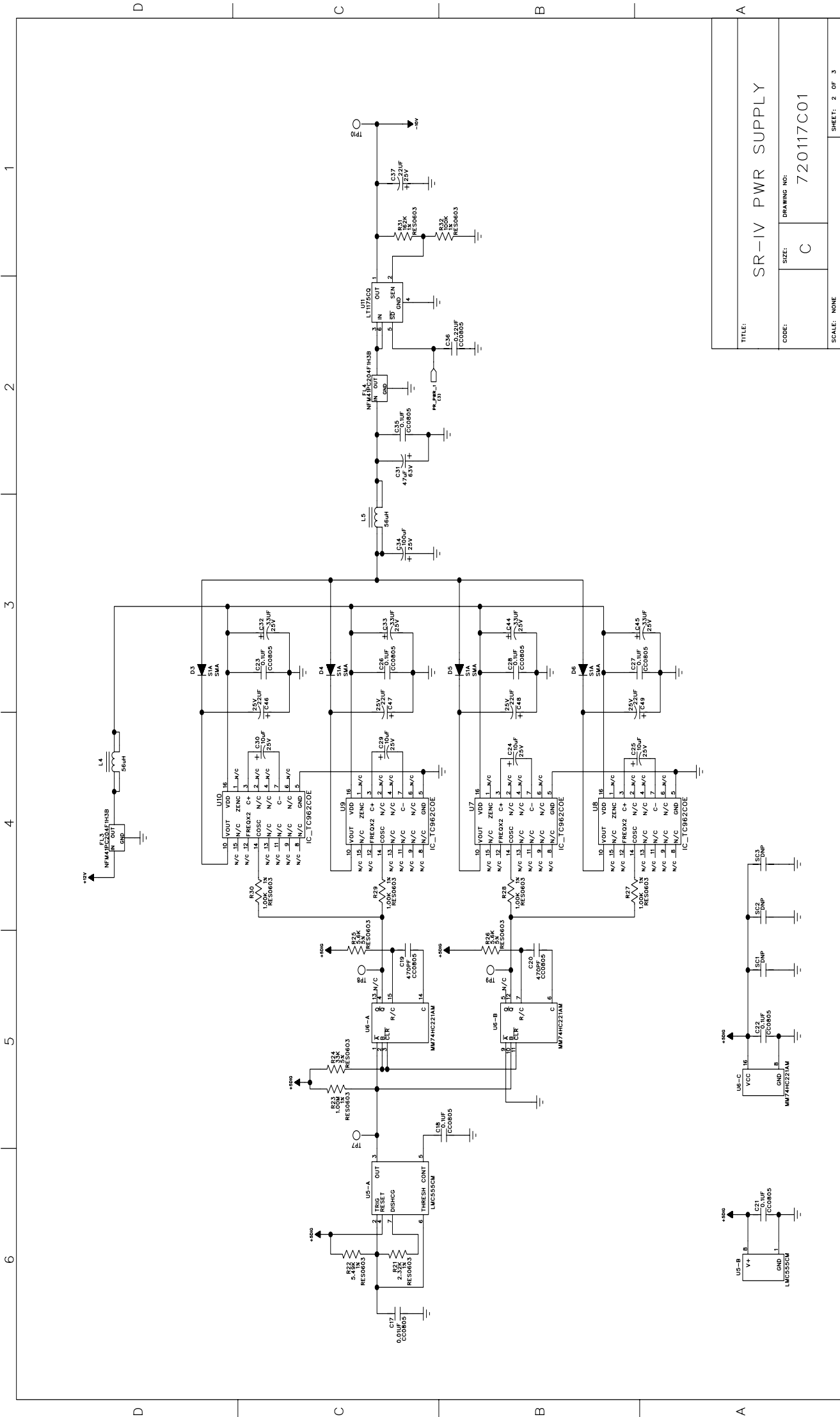




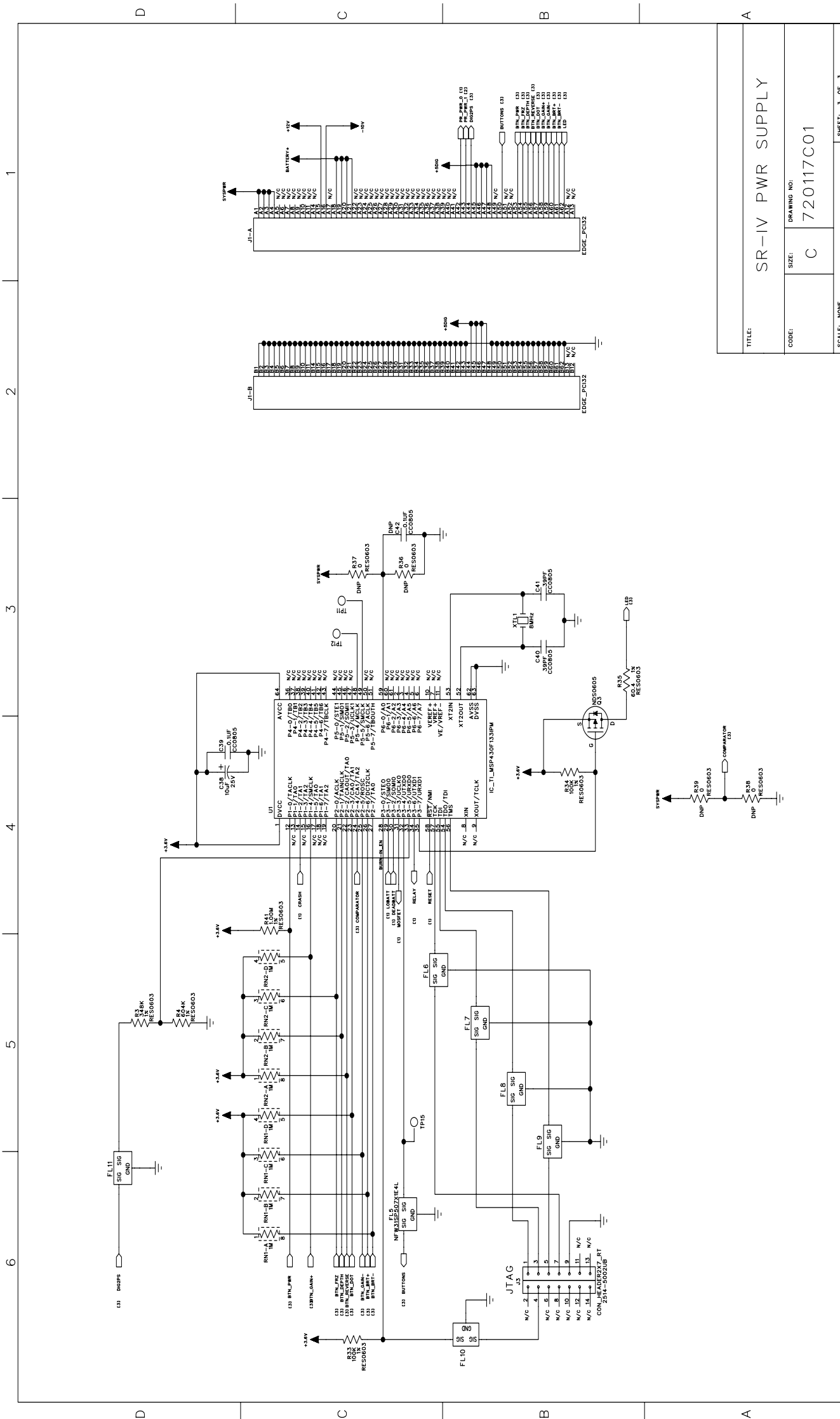


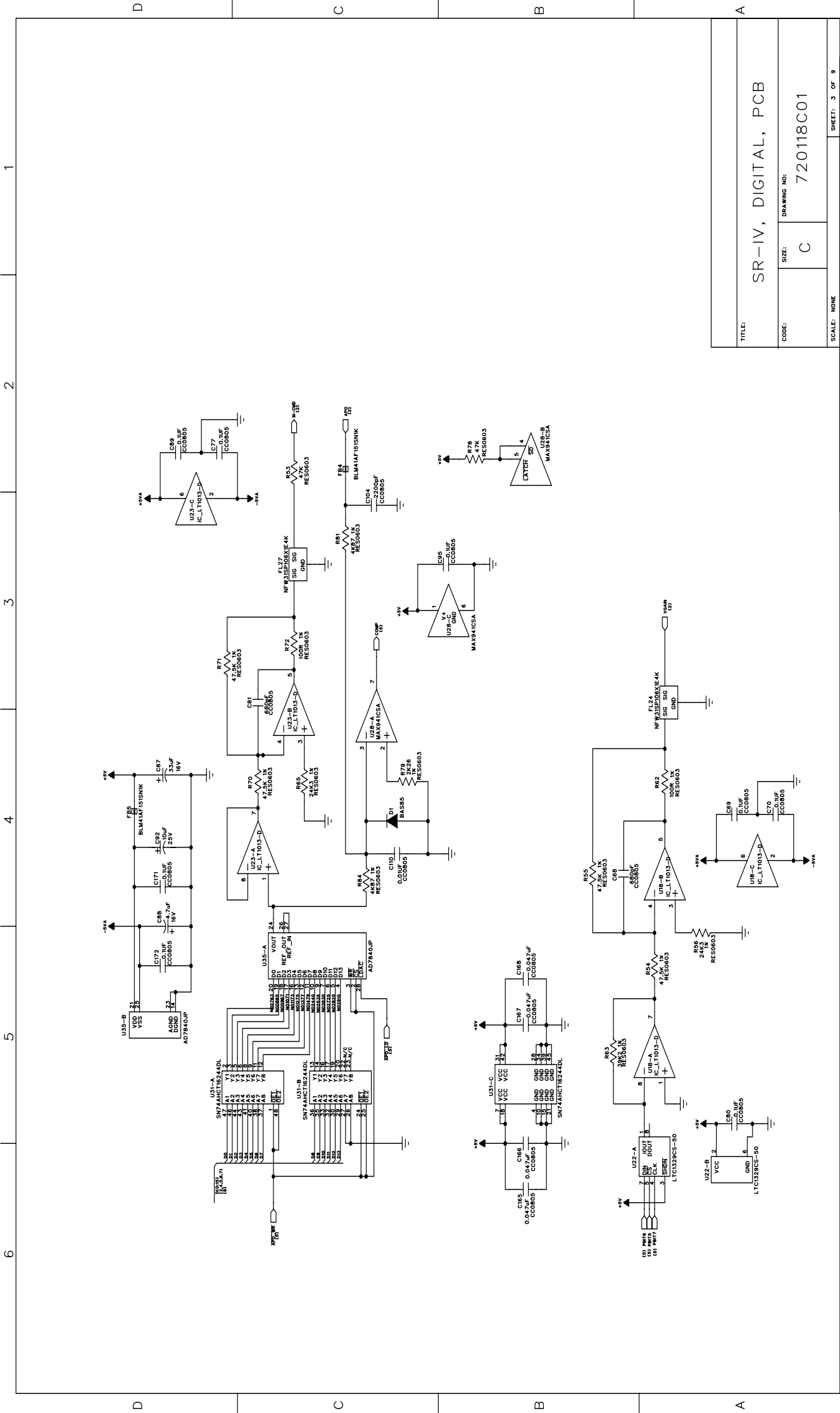


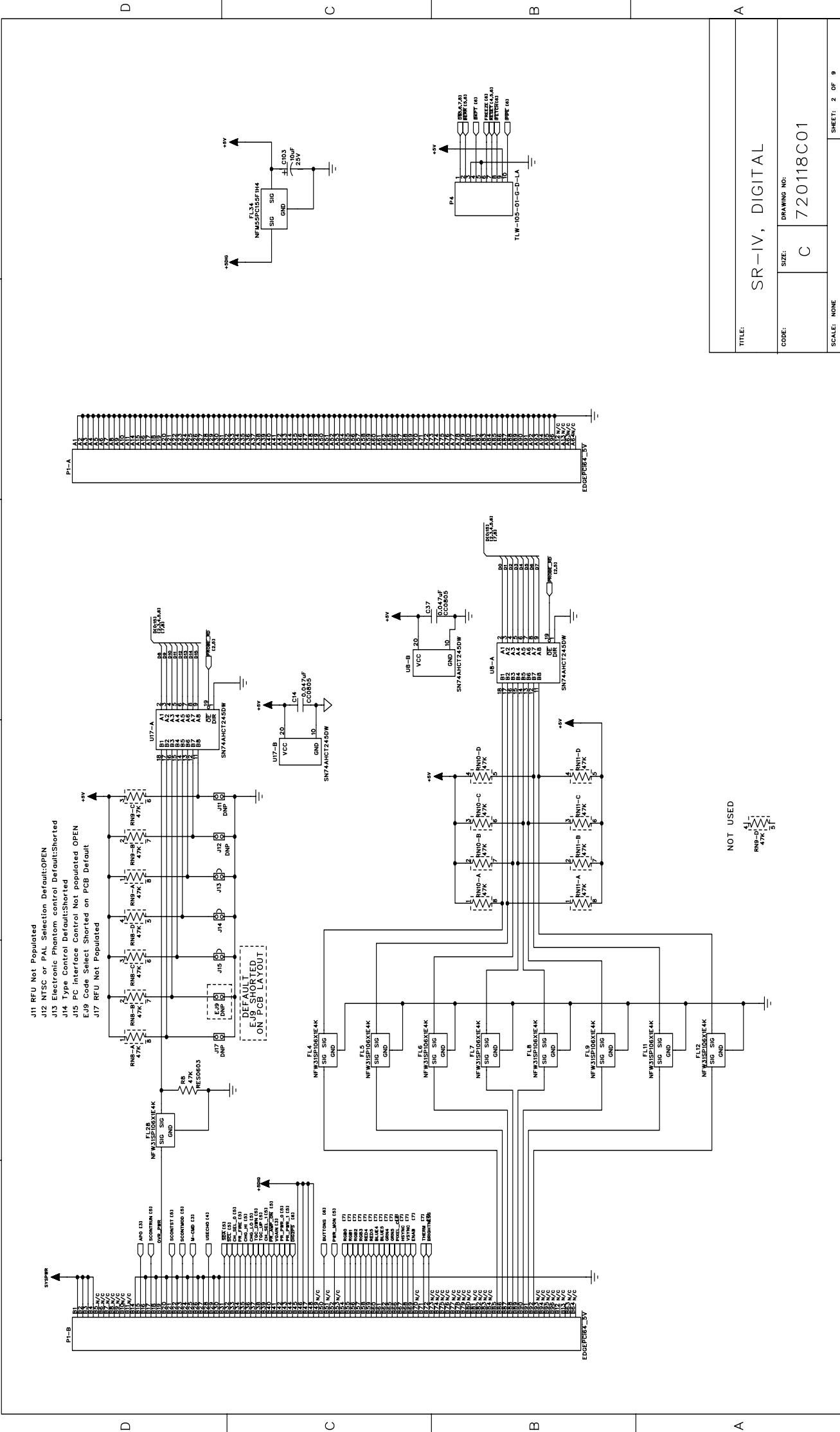


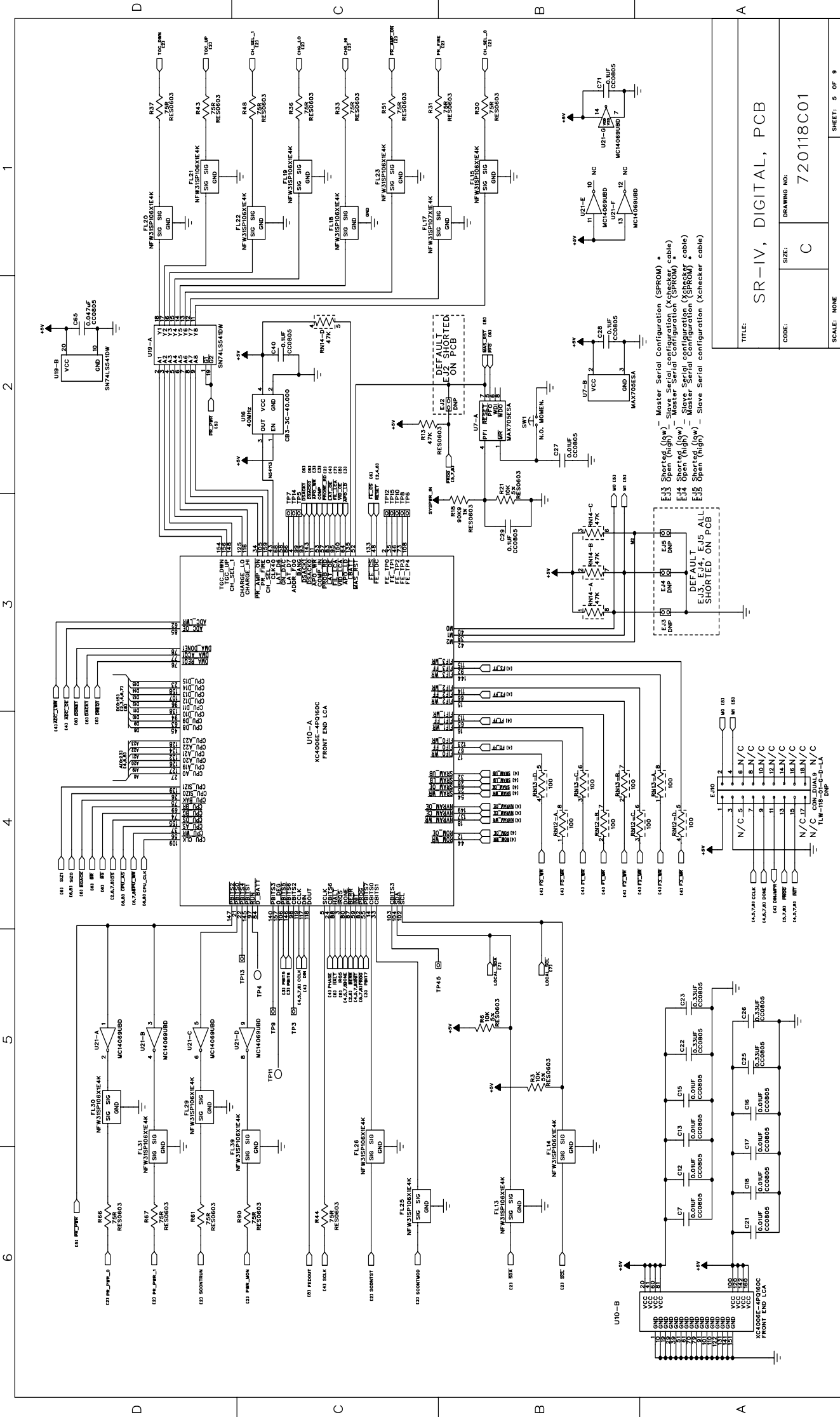


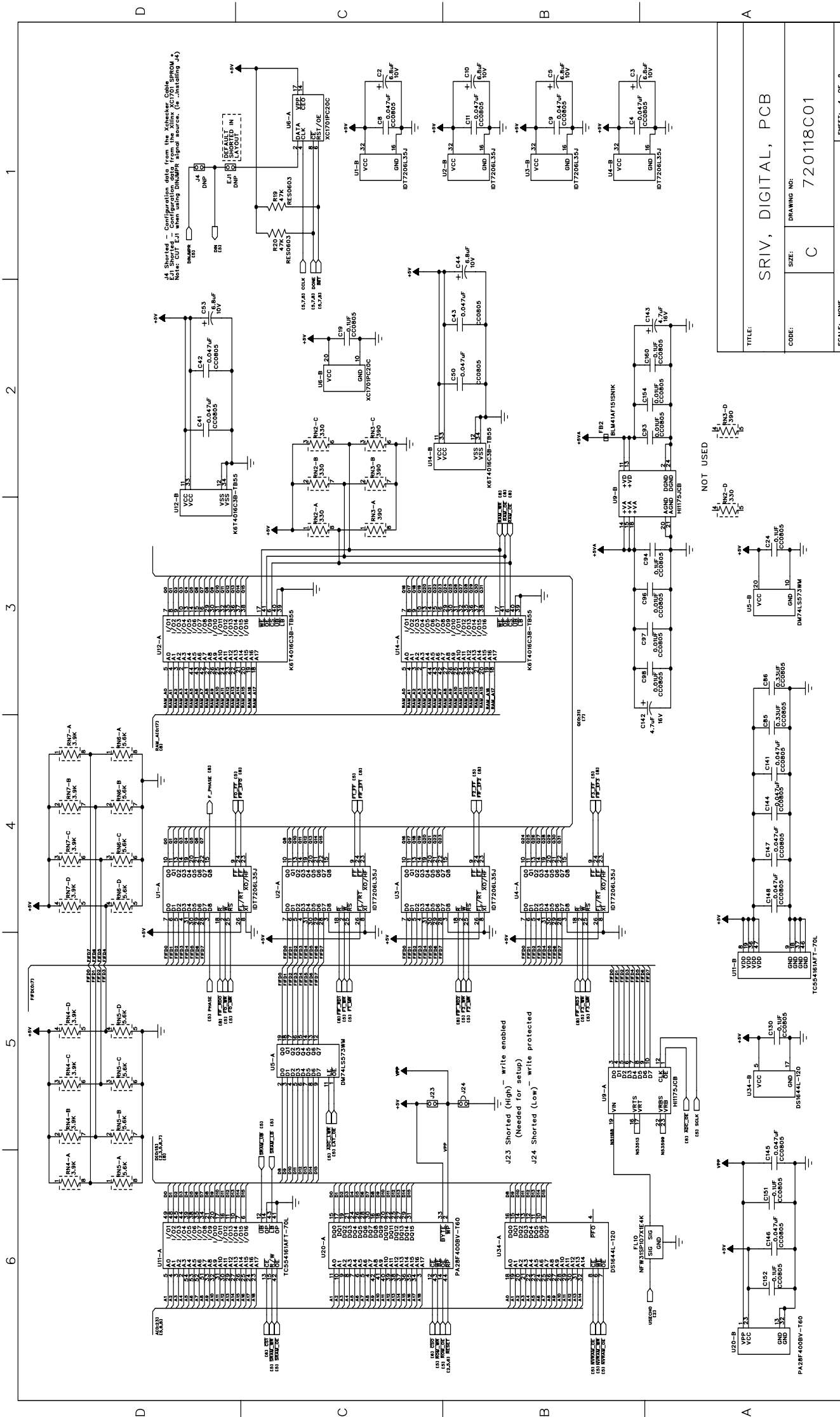
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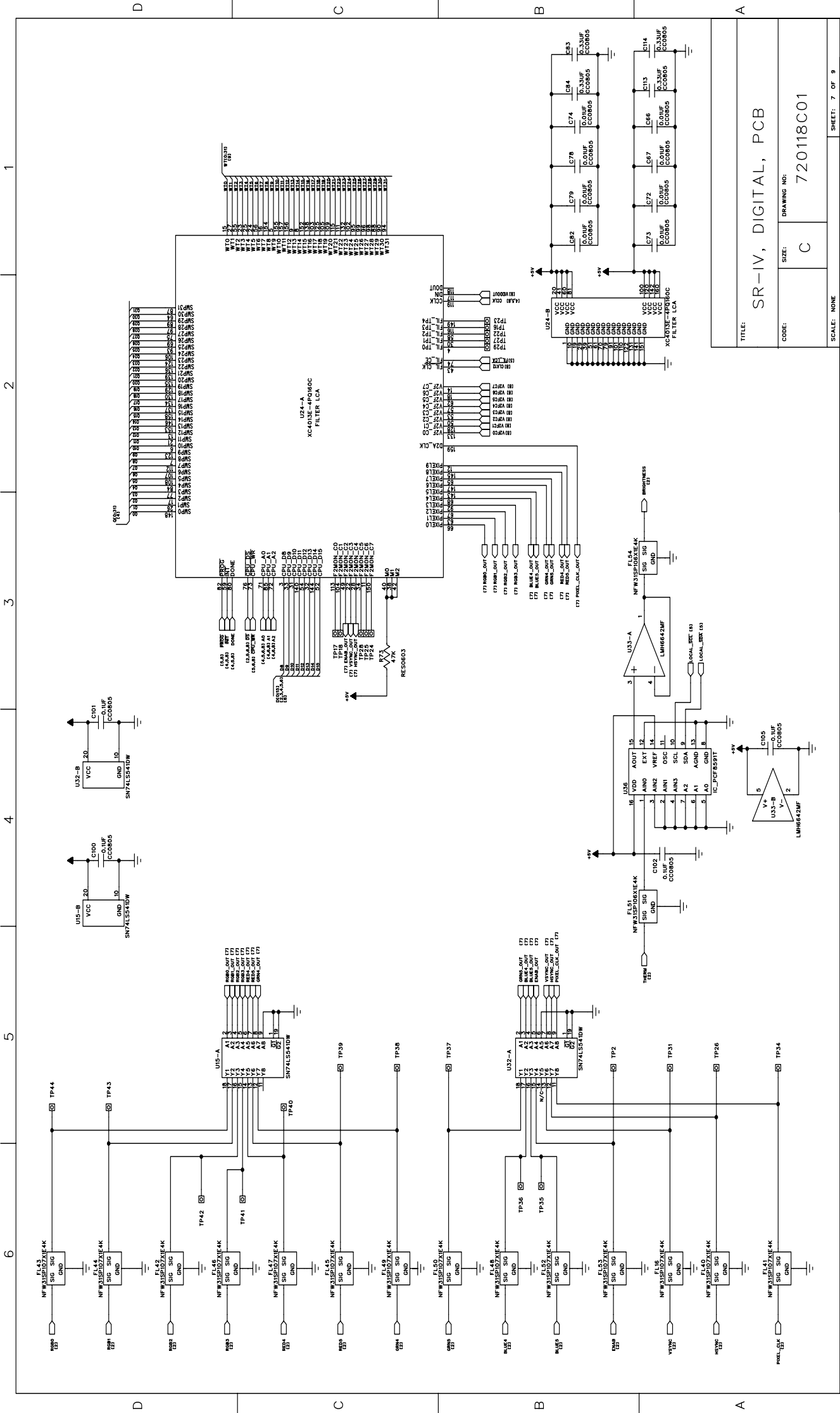


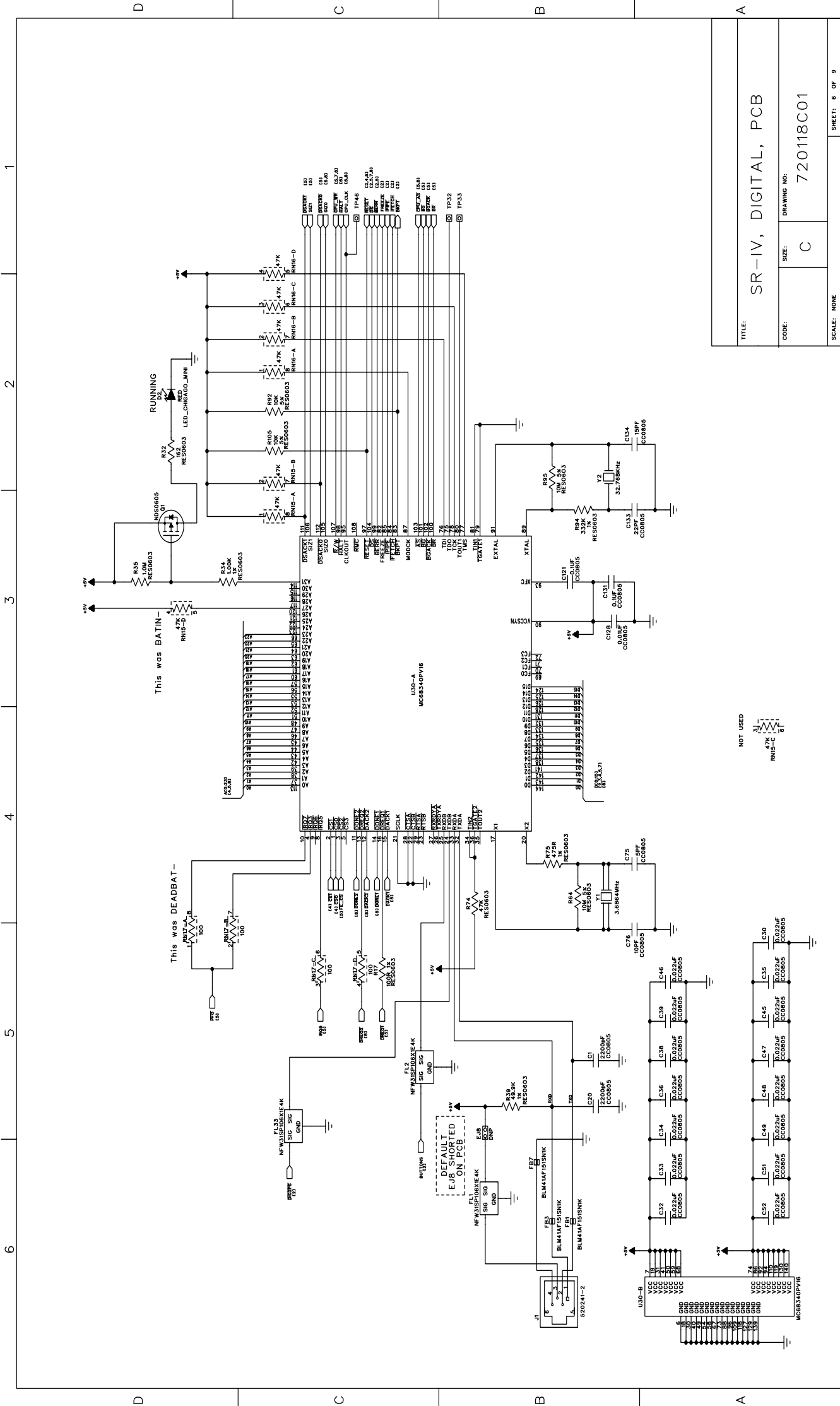


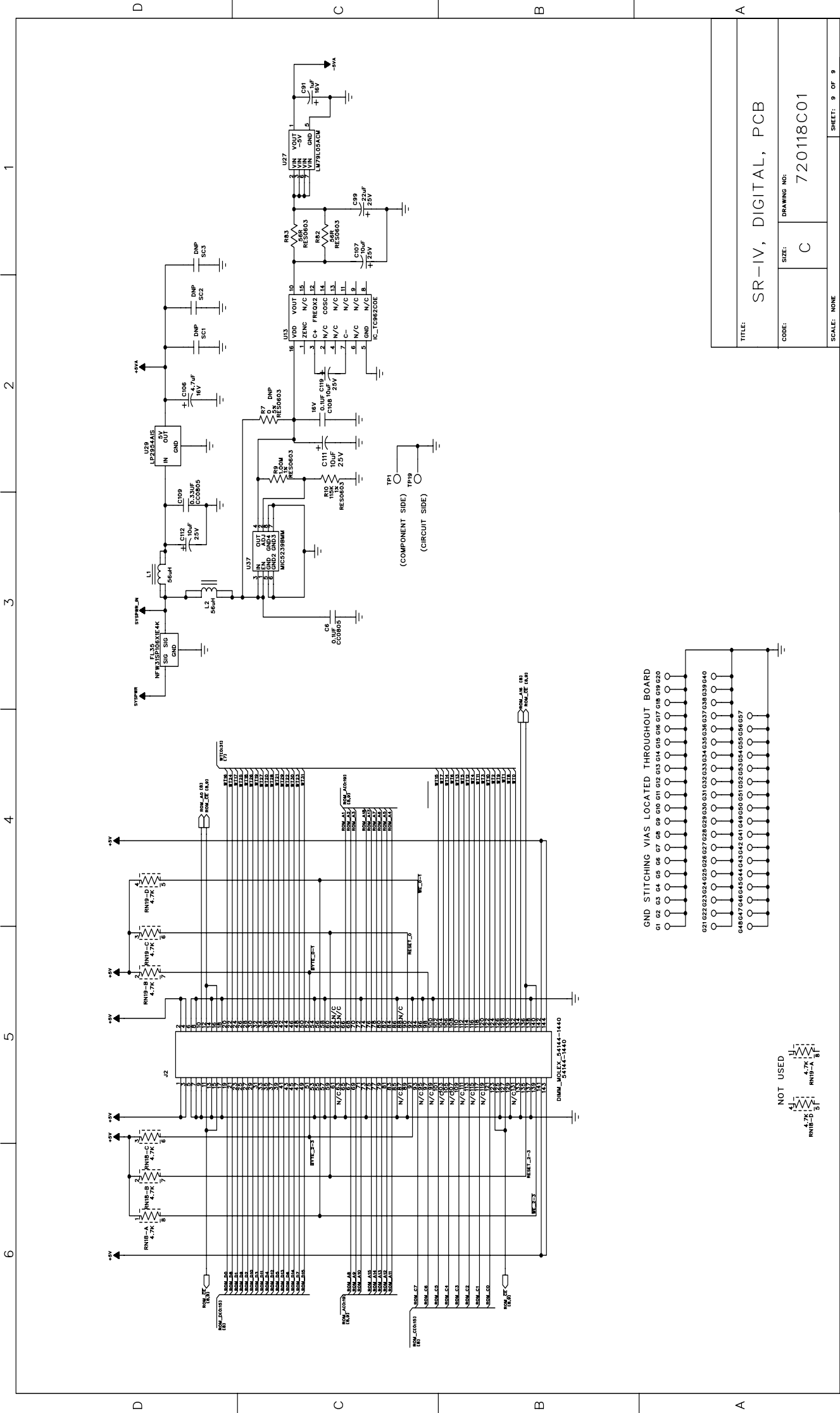


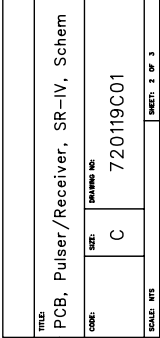


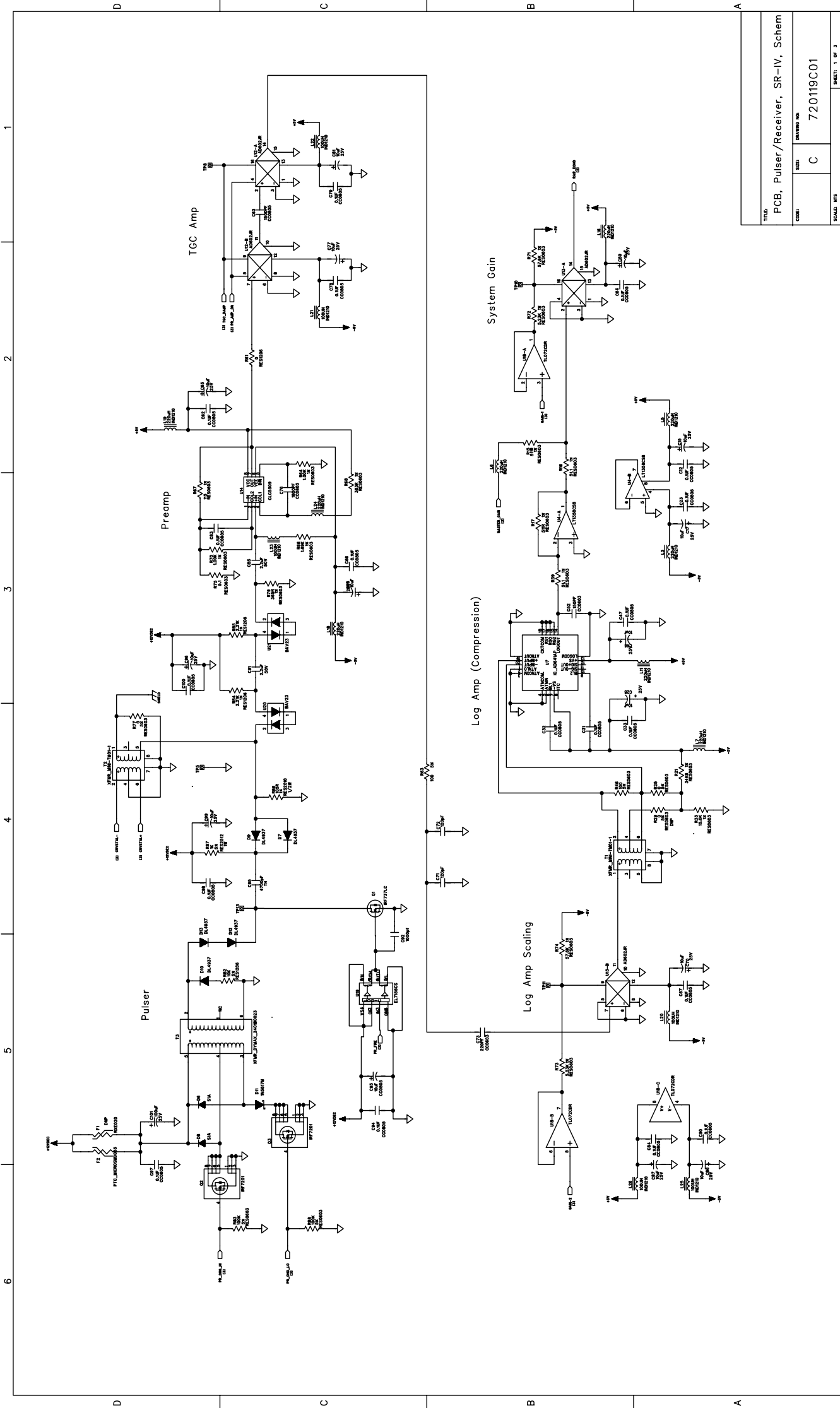


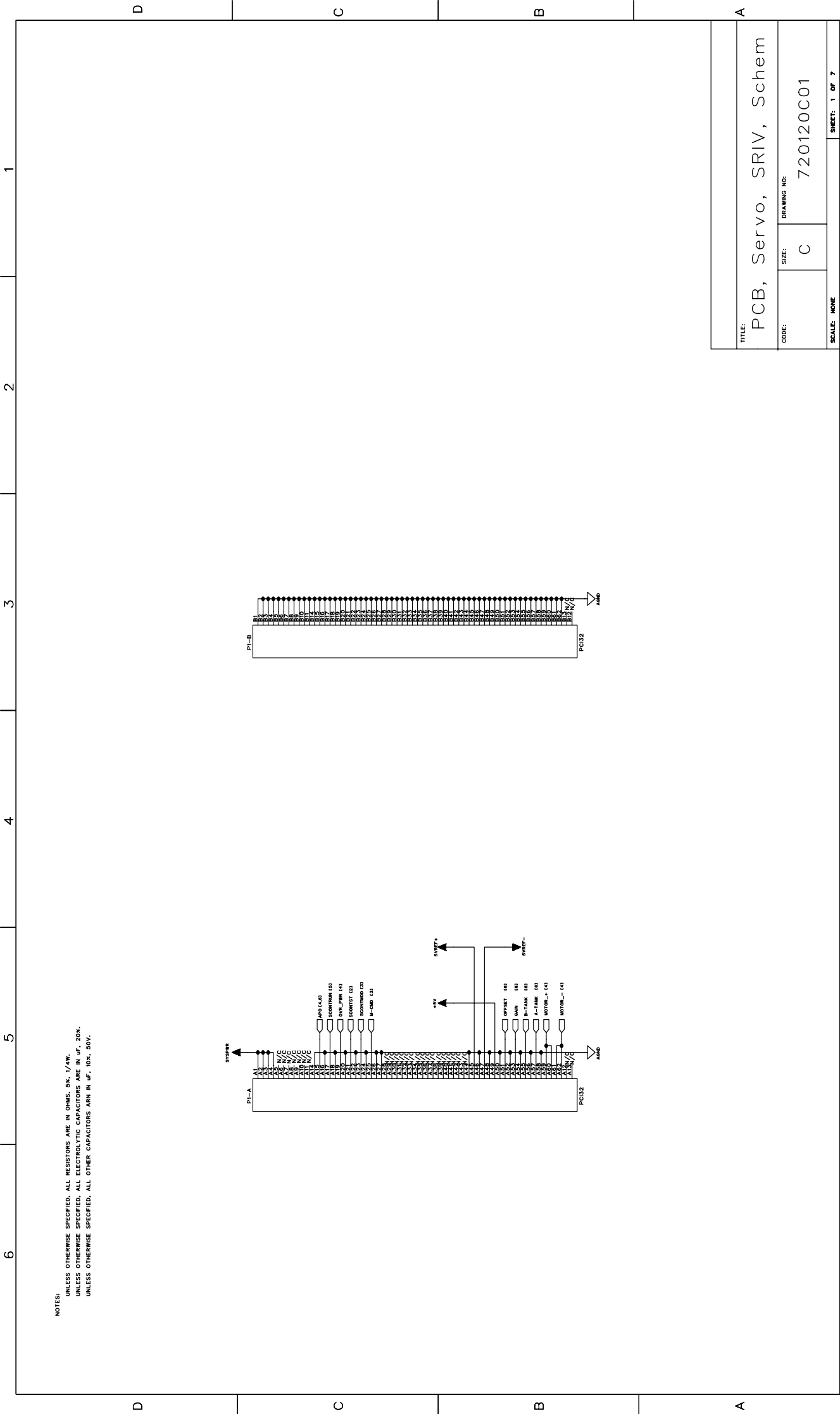


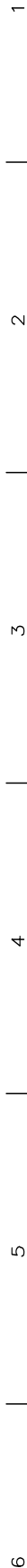


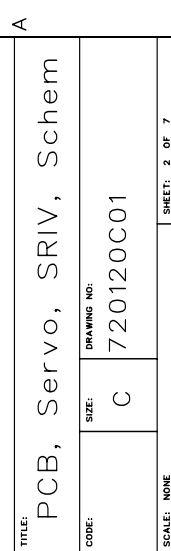




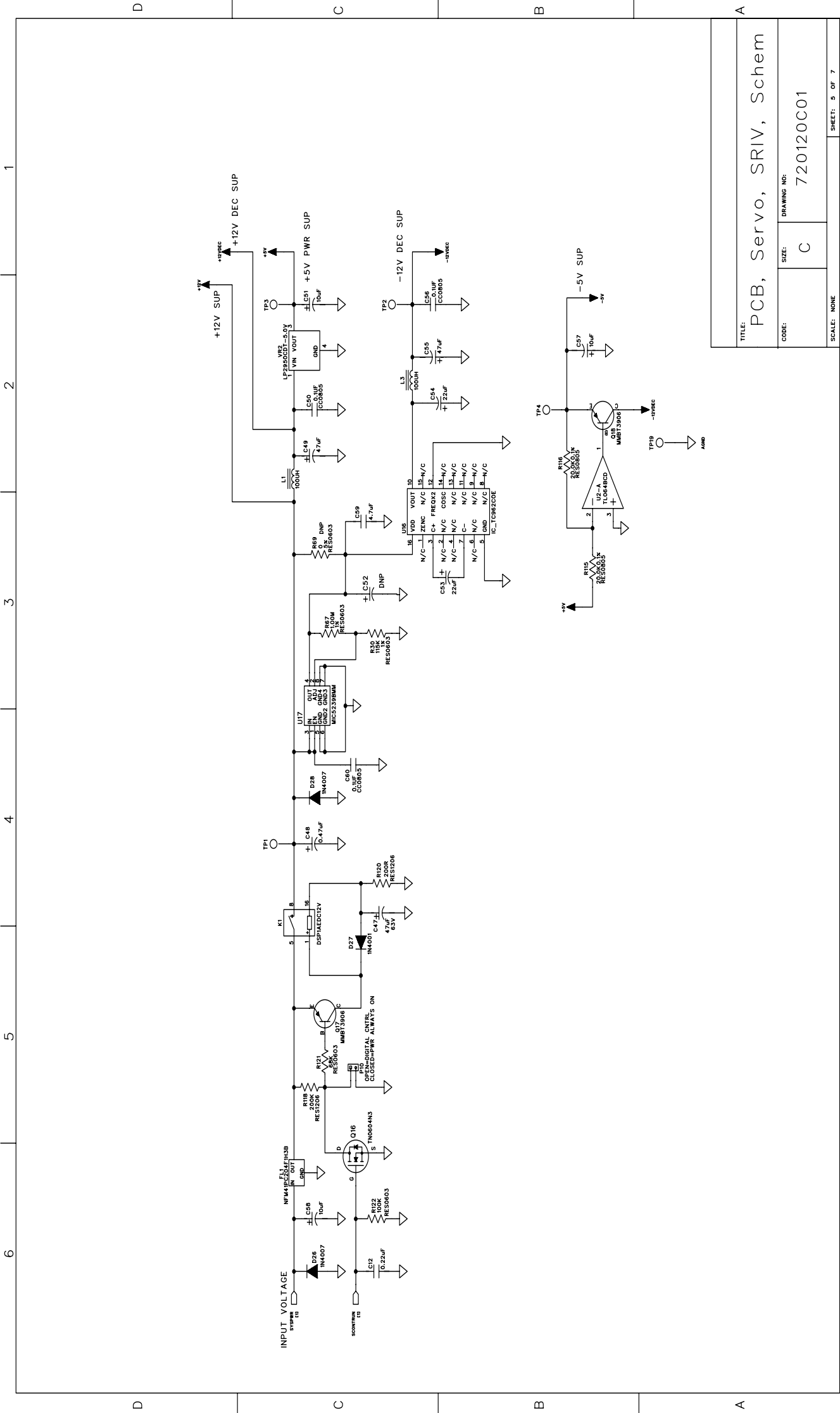








PCB, Servo, SRIV, Schem

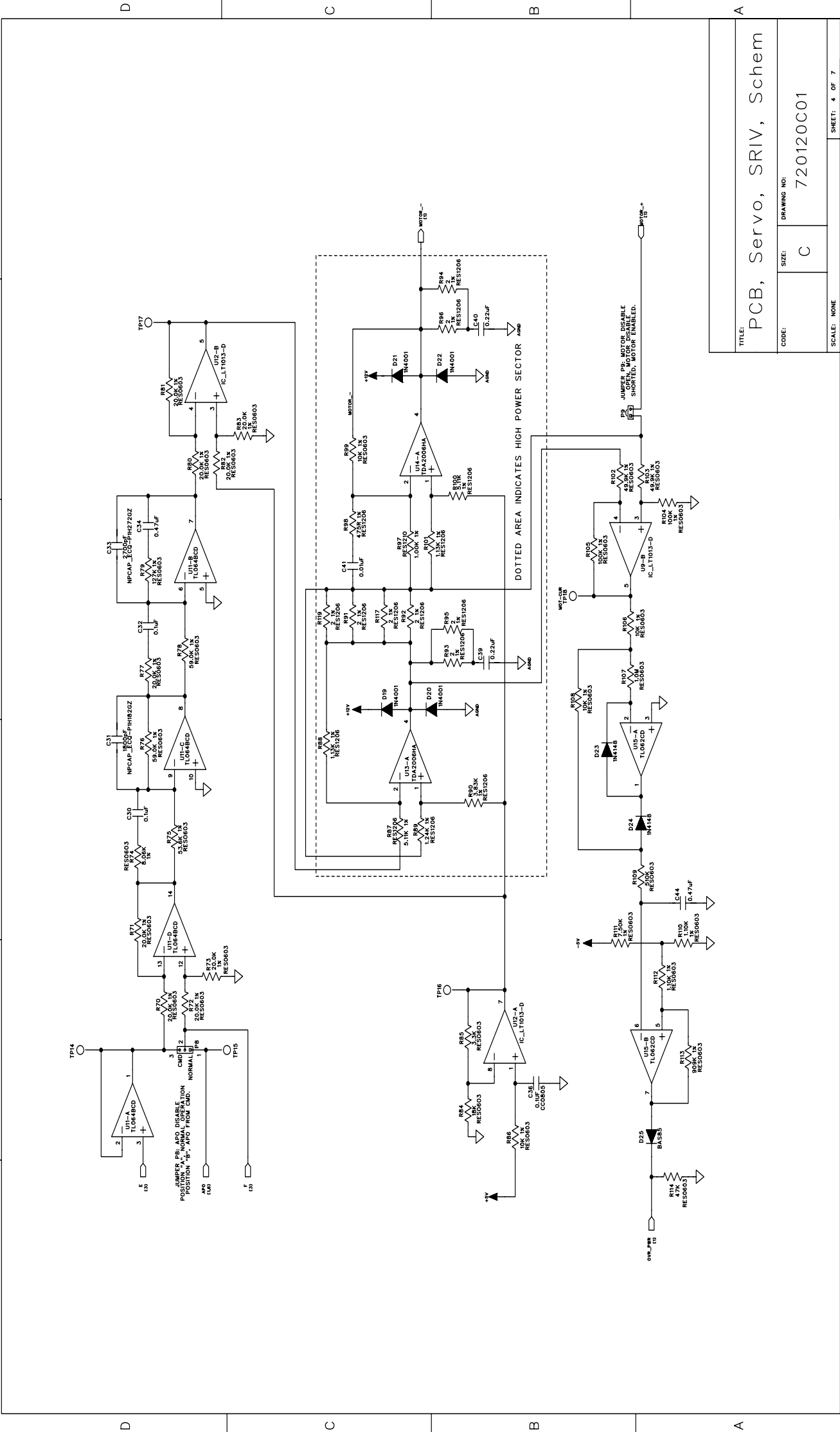


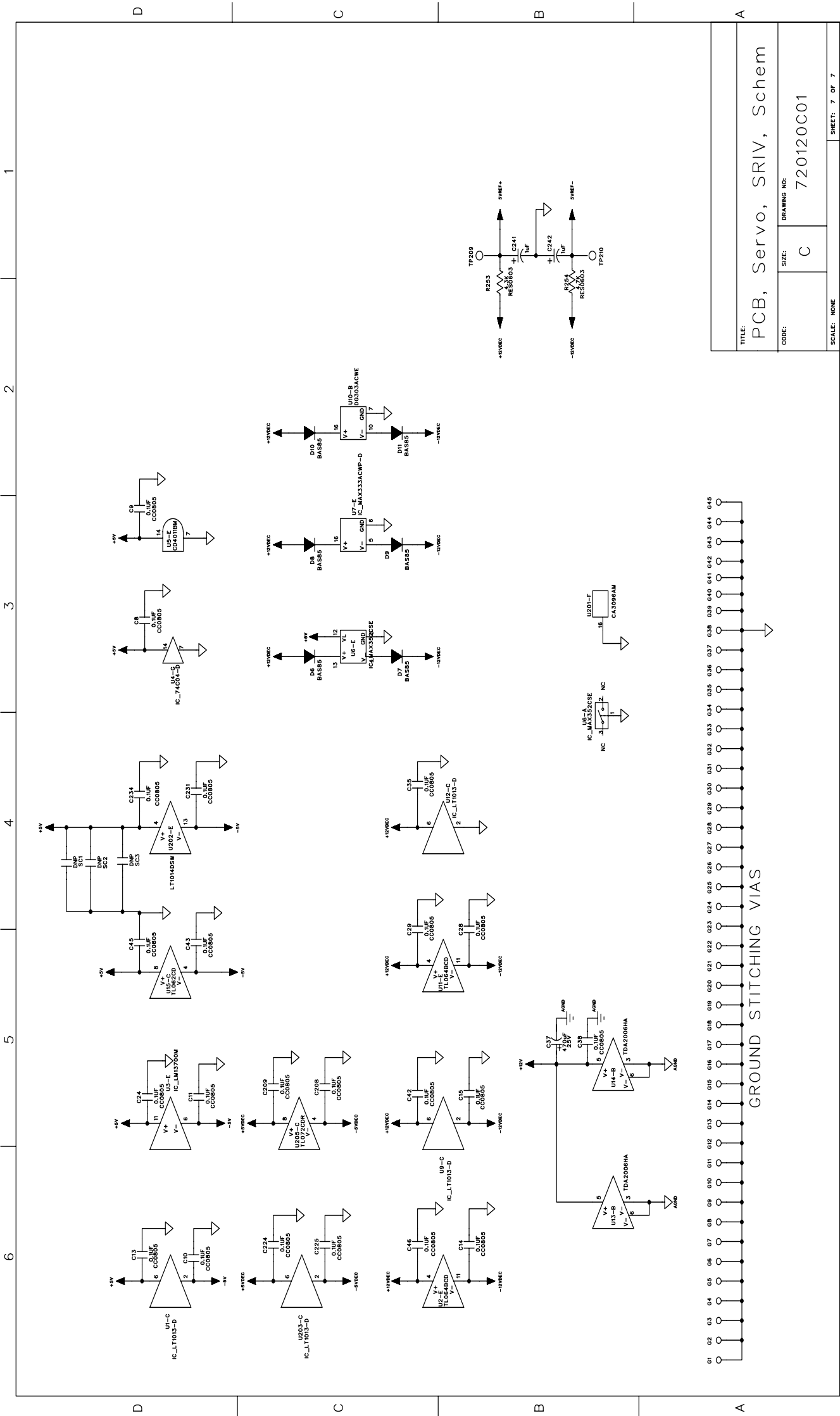
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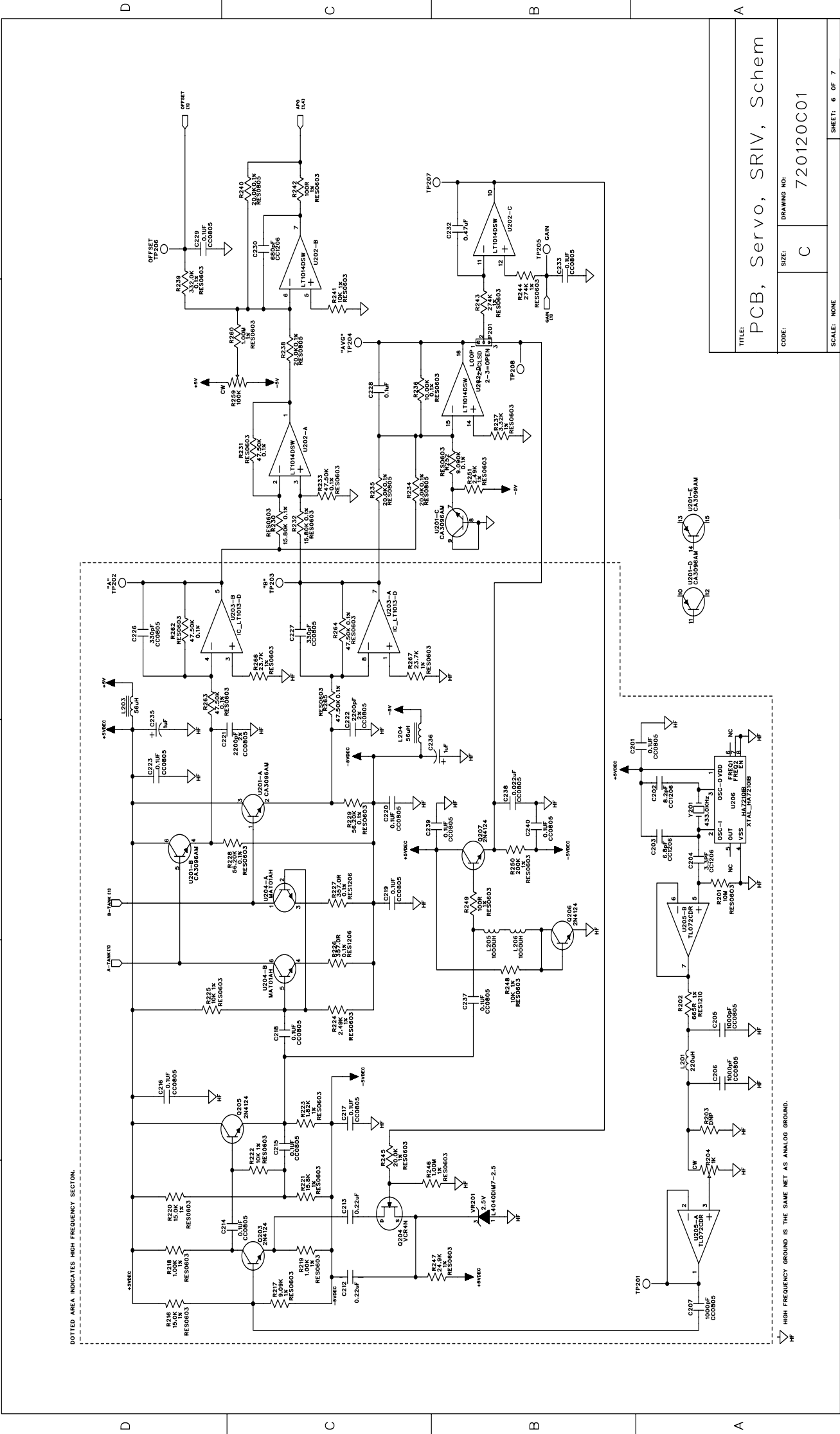
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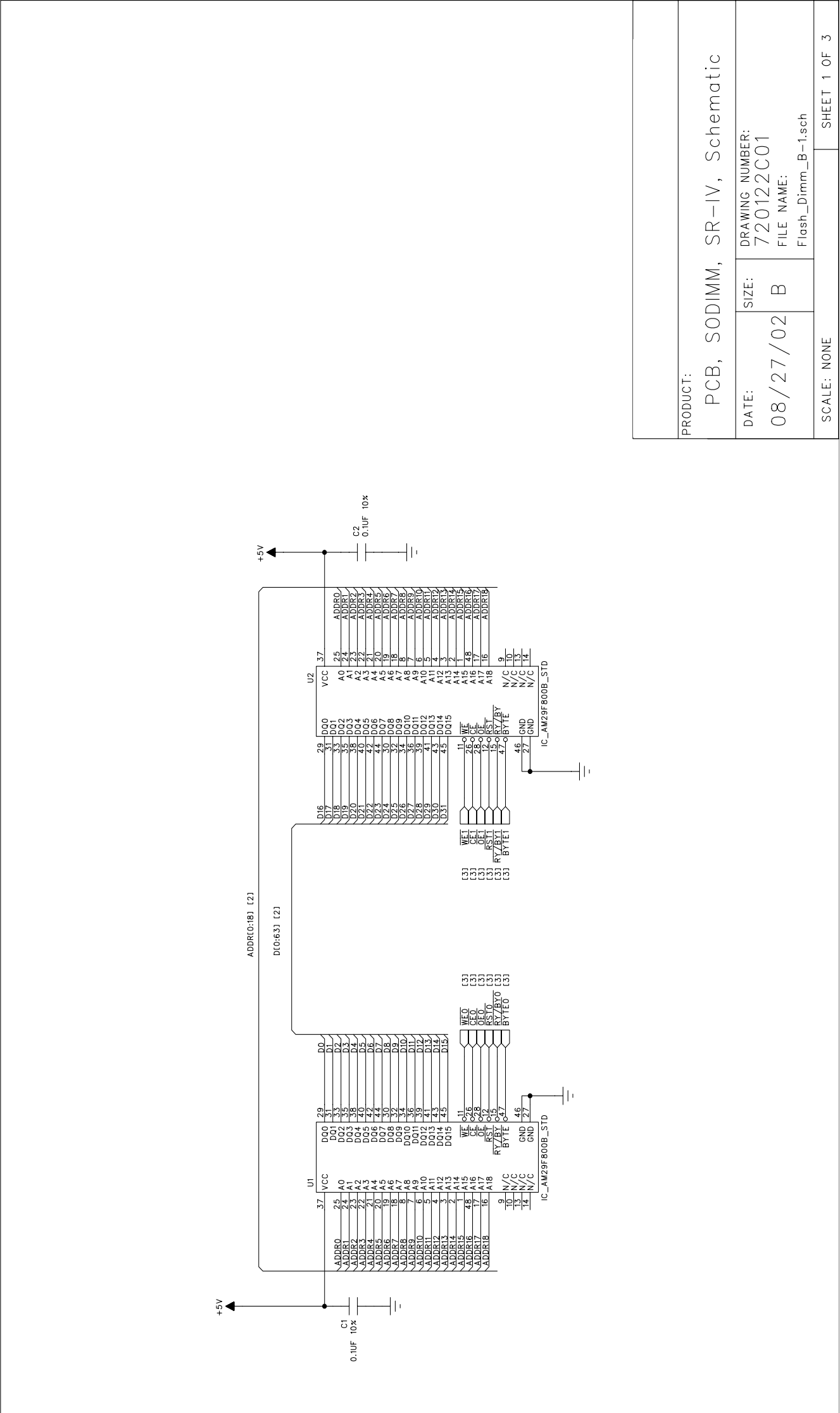
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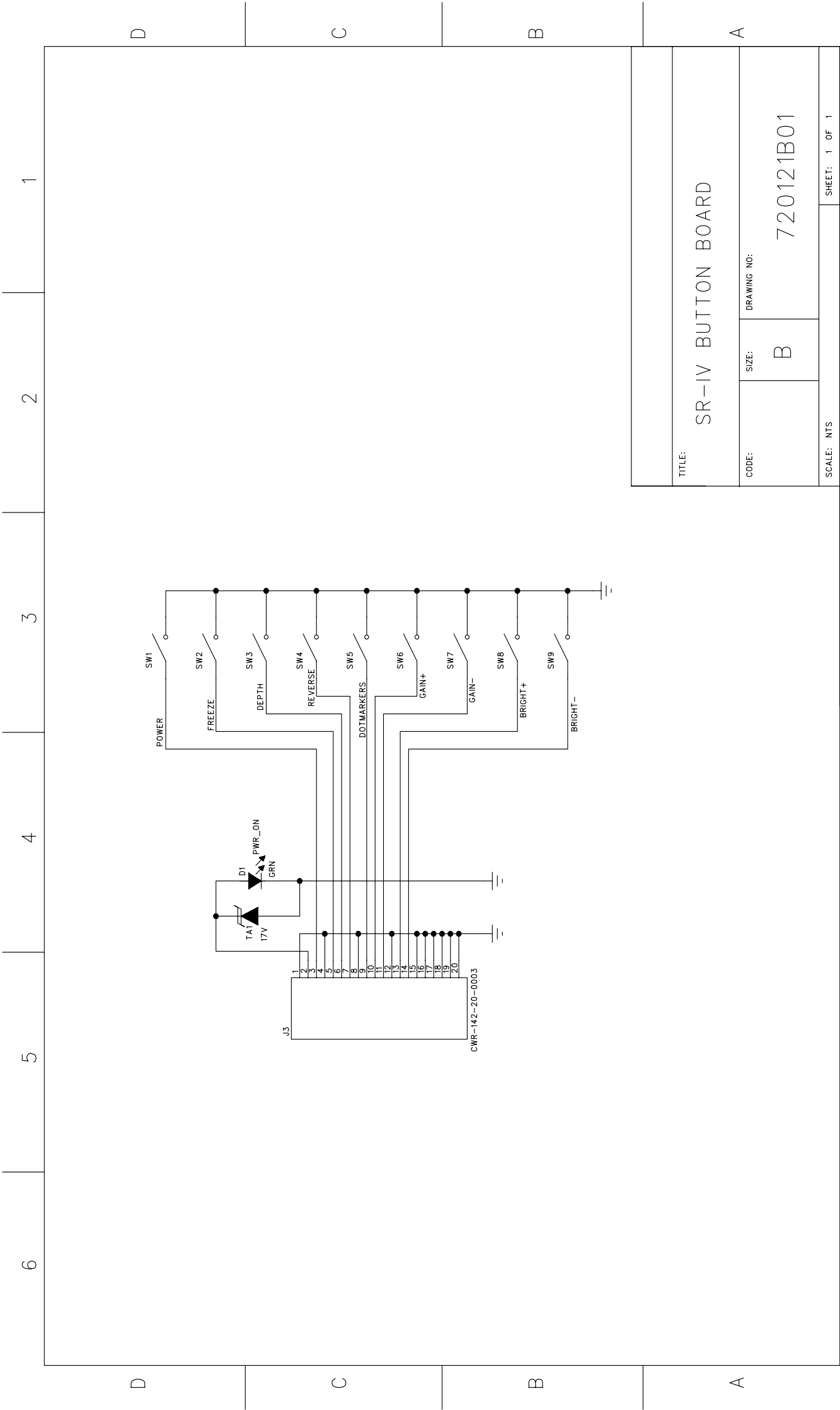
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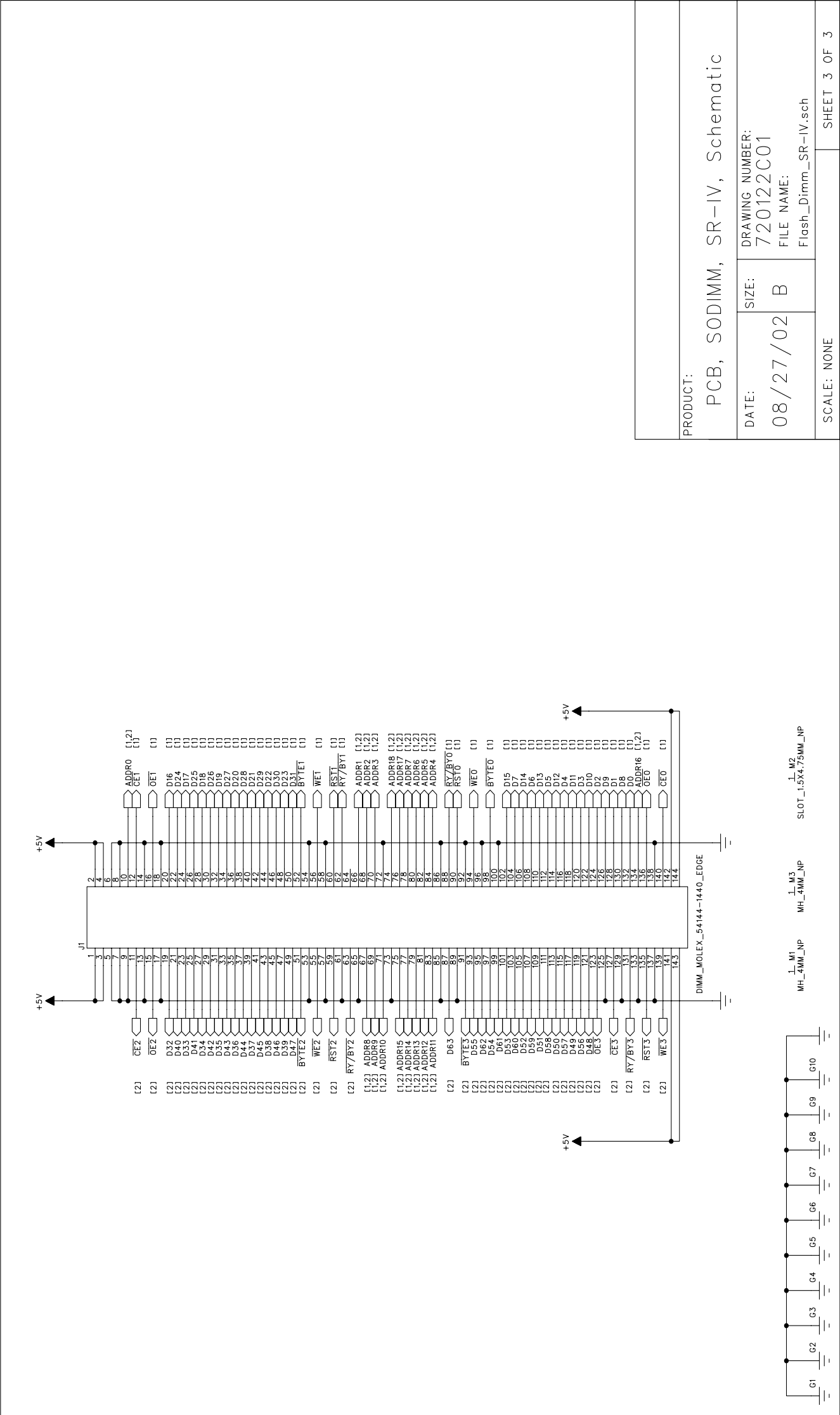




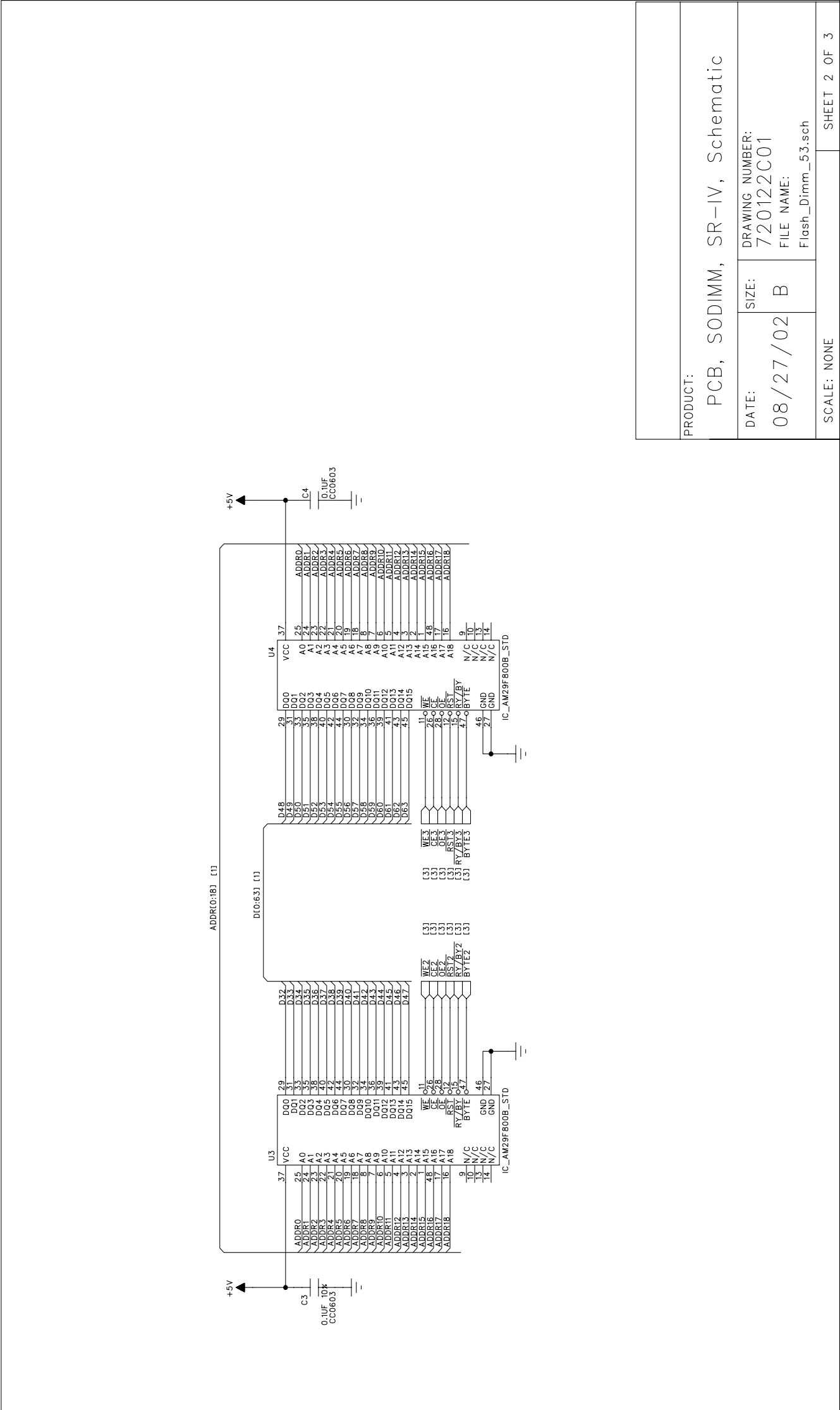








PRODUCT:			
PCB, SODIMM, SR-IV, Schematic			
DATE:	SIZE:	DRAWING NUMBER:	
08/27/02	B	720122C01	
SCALE: NONE		FILE NAME:	
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			SHEET 3 OF 3

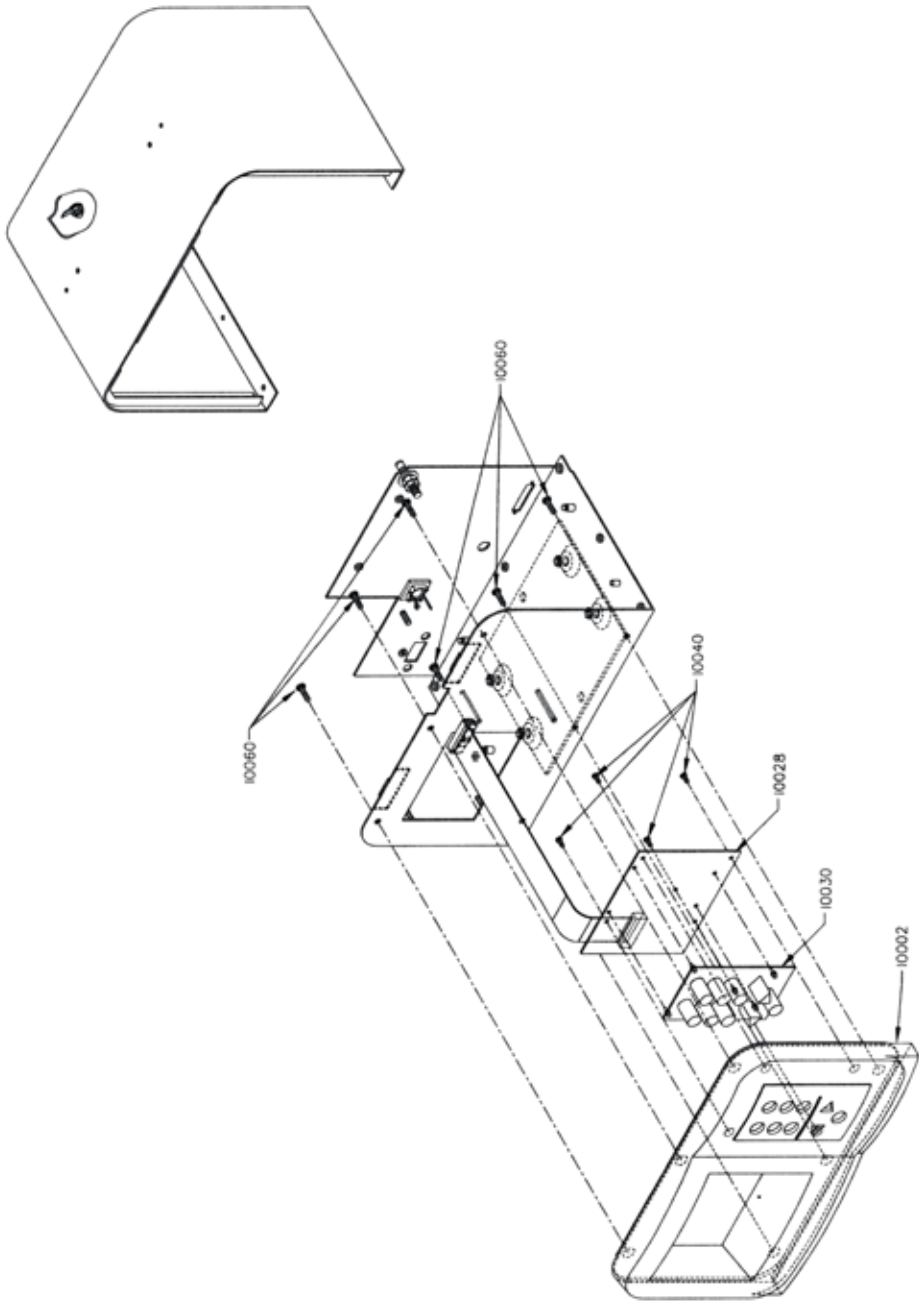


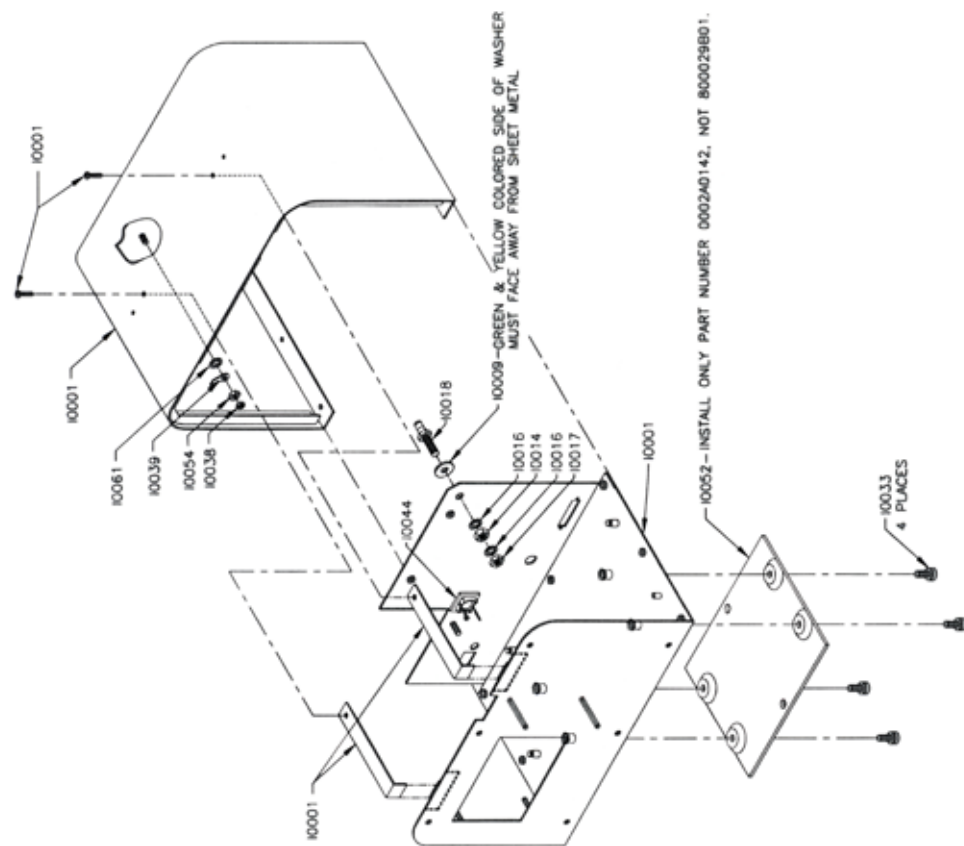
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PCB, SODIMM, SR-IV, Schematic		
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		FILE NAME:
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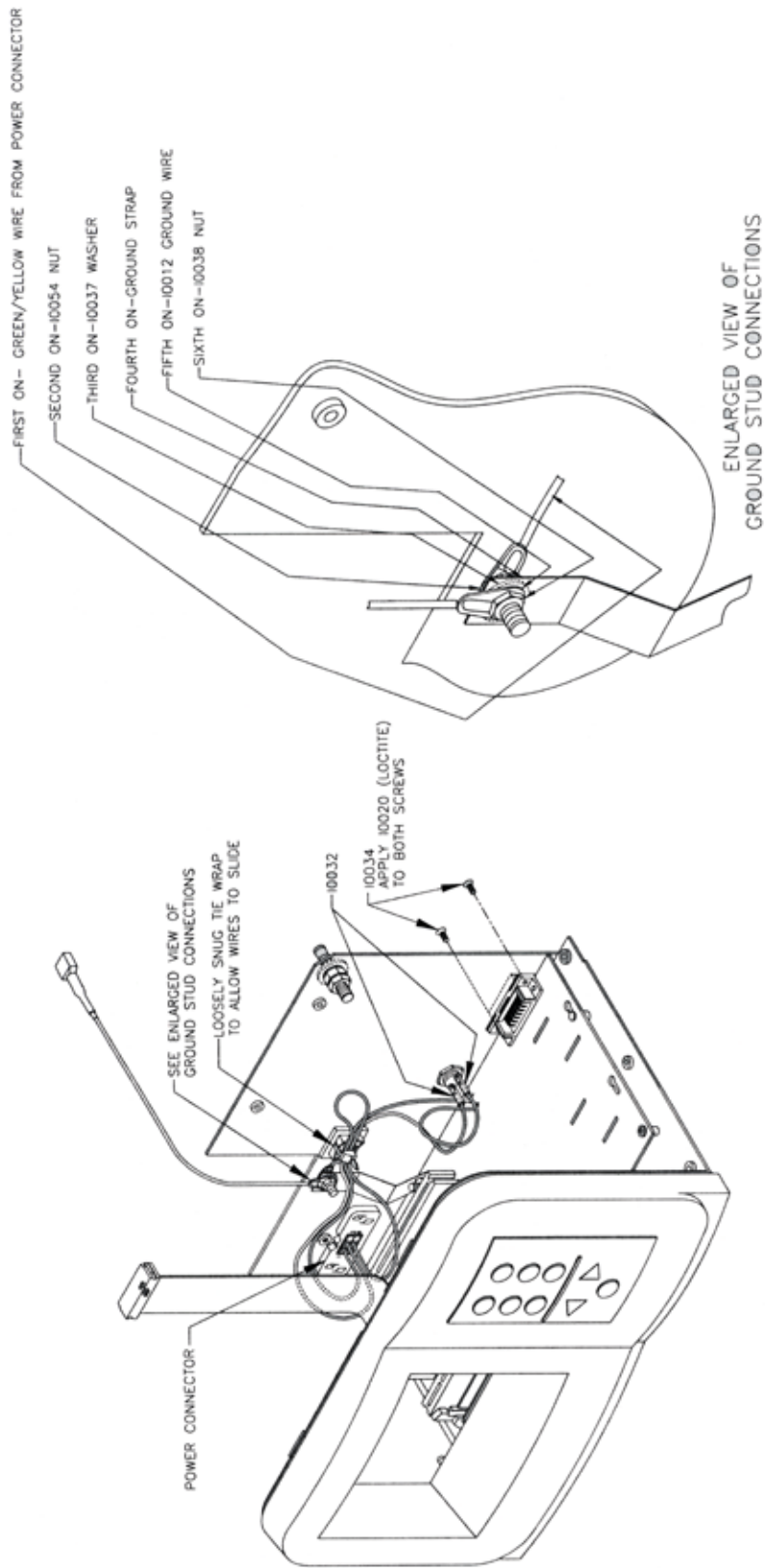
Appendix B - Mechanical Assembly Drawings

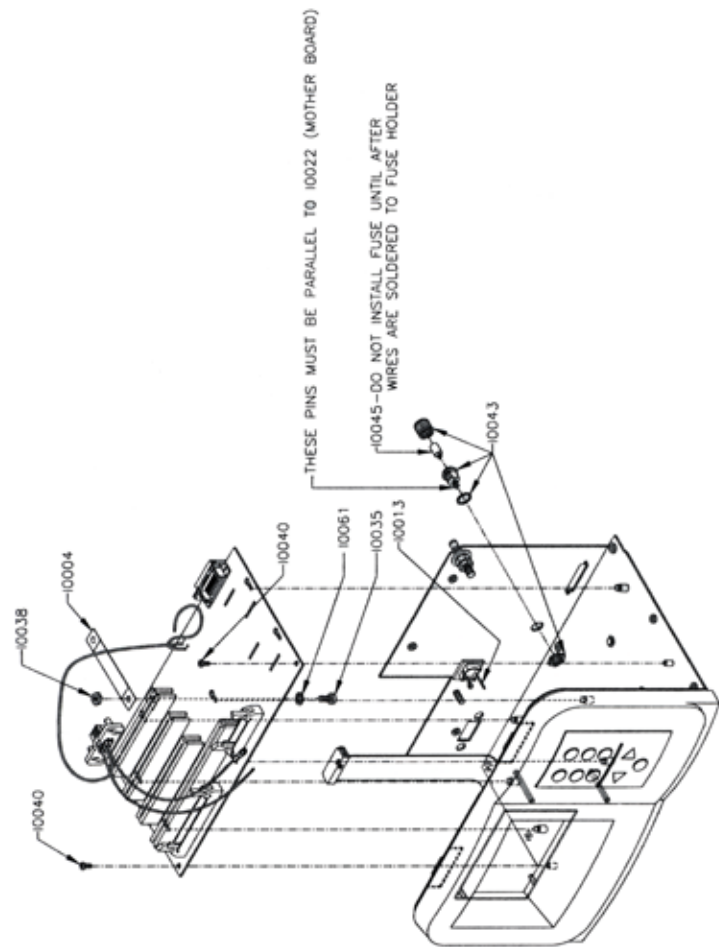
Assembly Name	Page Number
Figure B-1 - Scanner Bottom Case Assembly	51
Figure B-2 - Scanner Bezel Assembly.....	52
Figure B-3 - Scanner Motherboard Assembly	53
Figure B-4 - Scanner Motherboard Assembly - Exploded Ground Stud Connection.....	54
Figure B-5 - Scanner LCD Assembly.....	55
Figure B-6 - Scanner PCB Card Assembly	56
Figure B-7 - Scanner Top Case Assembly	57

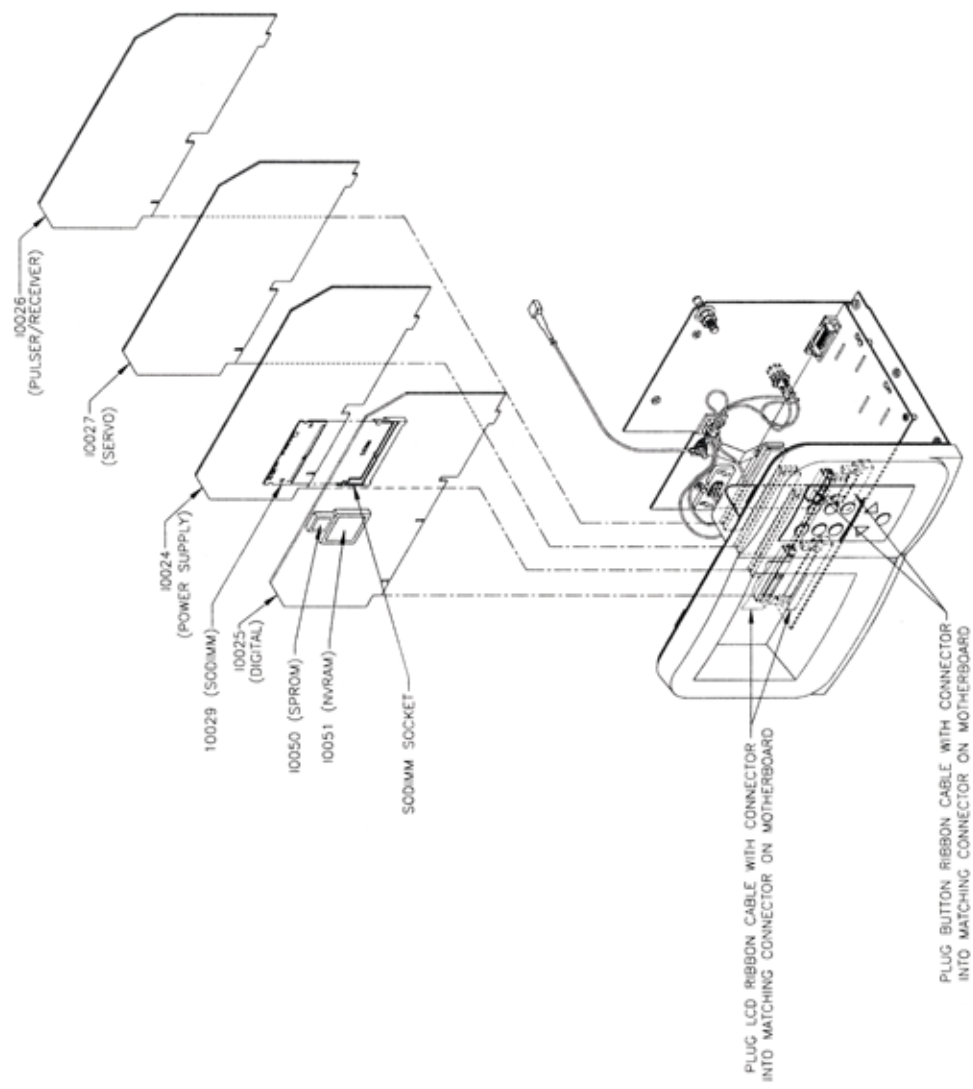


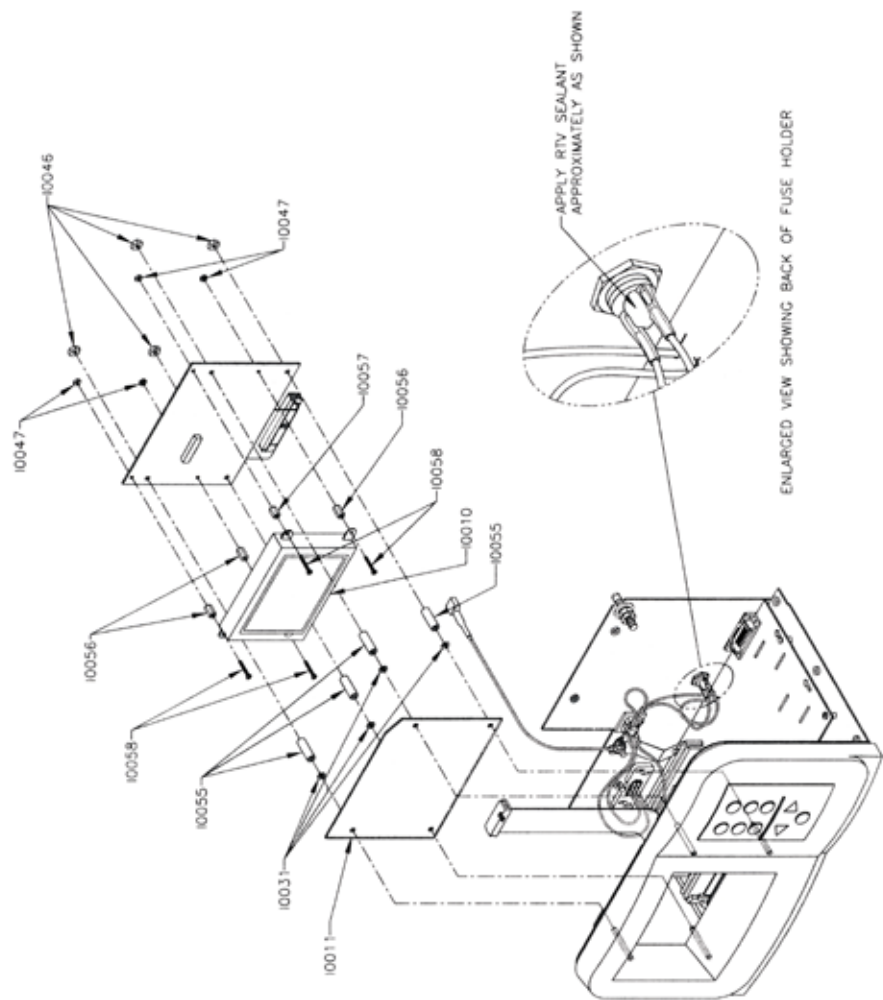


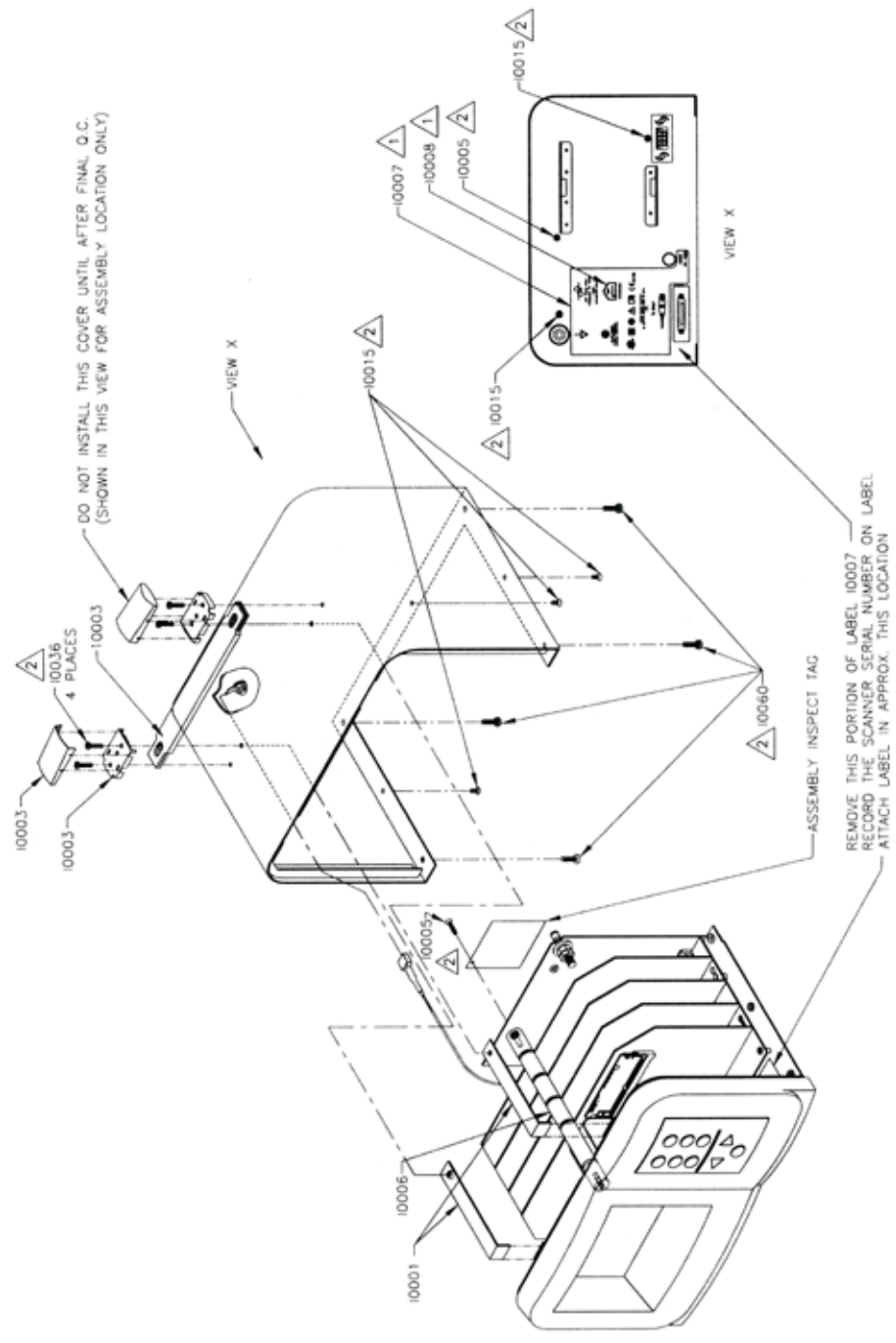












Appendix C - Bills of Material

SITE~RITE* IV Scanner Assembly

Ref. No.	Quantity	Description	Dymax Part No.
I0000.....	1.0 EA.....	PCB, PCI32 EXTENDER CARD, SRIV, ASSY	7 0 0 1 2 7 B 0 1
I0000.....	1.0 EA.....	SCANNERS, SRIV	800111B00
I0001.....	1.0 EA.....	ASSY, SRIV ENCLOSURE.....	800123A01
I0002.....	1.0 EA.....	BEZEL, SRIV W/ GRAPHICS.....	8 0 0 1 2 0 b 0 1
I0003.....	1.0 EA.....	HANDLE, ENCLOSURE, SRIV	0 0 0 2 b 0 1 1 6
I0004.....	1.0 EA.....	STRAP, GROUND, DIGITAL POWER SUPPLY	0 0 0 2 a 0 1 1 5
I0005.....	1.0 EA.....	SCREW, FLAT HEAD, 4-40 x 1/2", PHILLIPS, SS.....	1 3 0 1 A 0 0 8 4
I0006.....	1.0 EA.....	PCB RETAINER BRACKET, SRIV	0 6 0 1 b 0 1 6 5
I0009.....	1.0 EA.....	WASHER, FR-POAG-S	1301a0042
I0010.....	1.0 EA.....	LCD, 3.8", SHARP LQ038Q5DR01.....	0 5 0 1 b 0 0 0 4
I0011.....	1.0 EA.....	LCD SHIELD, SRIV	100081b01
I0012.....	1.0 EA.....	ASSY, SRIV, HOUSING GROUND WIRE	8 0 0 1 1 4 b 0 1
I0013.....	1.0 EA.....	TIE, NYLON CABLE NATURAL	1 3 0 1 a 0 0 0 1
I0014.....	1.0 EA.....	NUT, MU 0.8D/M6.....	1301a0043
I0015.....	5.0 EA.....	SCREW, FLAT HEAD, 4-40 X .250, PHILLIPS, SS.....	1 3 0 1 a 0 0 3 9
I0016.....	2.0 EA.....	LOCKWASHER, F/M6	1301a0044
I0017.....	1.0 EA.....	NUT, MU 0.5D/M6.....	1301a0045
I0018.....	1.0 EA.....	PLUG, POAG-S 6/15	0401a0184
I0022.....	1.0 EA.....	PCB, MOTHERBOARD, SRIV, ASSY.....	7 0 0 1 1 0 c 0 1
I0023.....	1.0 EA.....	PCB, LCD, SRIV, ASSY.....	700115b01
I0024.....	1.0 EA.....	PCB, POWER SUPPLY, SRIV, ASSY	7 0 0 1 1 7 c 0 1
I0025.....	1.0 EA.....	PCB, DIGITAL, SRIV, ASSY.....	700118c01
I0026.....	1.0 EA.....	PCB, PULSER / RECEIVER, SRIV, ASSY.....	7 0 0 1 1 9 c 0 1
I0027.....	1.0 EA.....	PCB, SERVO, SRIV, ASSY	700120c01
I0028.....	1.0 EA.....	PCB, BUTTON, SRIV, ASSY.....	7 0 0 1 2 1 b 0 1
I0029.....	1.0 EA.....	PCB, SODIMM, SRIV, ASSY.....	700122c01
I0030.....	1.0 EA.....	OVERLAY, SRIV BUTTON	1 4 0 1 b 0 0 7 0
I0031.....	4.0 EA.....	WASHER, FLAT, #6, NYLON, .031 THICK	1 3 0 1 a 0 0 8 2
I0032.....	0.083 FT.....	TUBING, 1/8" CLEAR HEAT SHRINK	0 9 0 1 a 0 0 1 7
I0033.....	4.0 EA.....	SCREW, PAN HEAD W/ES, 10-32 x 1/2, PHILLIPS,SS	1 3 0 1 a 0 0 8 1
I0034.....	2.0 EA.....	SCREW:METRIC,M2.5X5MM,PHILIPS,FLAT	c p - m 2 . 5 - . 4 5 x 5 s s
I0035.....	1.0 EA.....	SCREW, PAN HEAD, 8-32 X .375, PHILLIPS, SS	1 3 0 1 A 0 0 3 4
I0036.....	2.0 EA.....	SCREW, PAN HEAD, 4-40 X .500, PHILLIPS, SS	1301a0040
I0037.....	2.0 EA.....	WASHER, #8 FLAT, STAINLESS STEEL.....	w 8 s s
I0038.....	3.0 EA.....	NUT, 8-32 SMALL PATTERN, SS	1 3 0 1 a 0 0 2 3
I0039.....	1.0 EA.....	SPADE LUG (CONCORD 701-2796)	1 3 0 1 a 0 0 7 0

Appendix D - Jumper Definitions

Digital PCB Jumper Definitions
Default Settings Designated with *

Jumper Designation	Jumper Definition	Function with Jumper Installed	Function with Jumper Removed (Open)
J4 †	Configuration Selection	Configure from Xchecker cable	* Configure from XC1701 PROM
(See Warning 1 at the end of the table)		† Must be removed when Jumper EJ1 is shorted	
EJ1 ‡	Configuration Selection	* Configure from XC1701 PROM	Configure from Xchecker cable
(See Warning 1 at the end of the table)		‡ Must be opened when Jumper J4 is installed	
J11	Reserved for future use		*
J12	Reserved for future use		*
J13	Electronic Phantom Control	* Electronic phantom off	Electronic phantom on
J14	Type Control	* <i>Site-Rite System</i>	<i>Vet-Rite System</i>
J15	PC Interface Control	* PC interface disabled	PC interface enabled
EJ9	Code Selection	* Run normal scanner code	Run equal time code
J17	Reserved for future use		*
J23 †	Flash Memory write enable	Write enabled (use for setup)	(See Warning 2 at the end of the table)
† Must be removed when Jumper J24 is installed			
J24 ‡	Flash Memory write disable	* Write disabled (use for normal op.)	(See Warning 2 at the end of the table)

Warning: DO NOT install both Jumper J4 and Jumper J5. If Jumper J4 is installed, Jumper J5 MUST BE REMOVED. If Jumper J5 is installed, Jumper J4 MUST BE REMOVED. When both jumpers are installed, POWER IS CONNECTED DIRECTLY TO GROUND. This WILL DESTROY the Digital PCB and may result personnel injury.

Warning: DO NOT install both Jumper J23 and Jumper J24. If Jumper J23 is installed, Jumper J24 MUST BE REMOVED. If Jumper J24 is installed, Jumper J23 MUST BE REMOVED. When both jumpers are installed, POWER IS CONNECTED DIRECTLY TO GROUND. This WILL DESTROY the Digital PCB and may result personnel injury.

Servo PCB Two Pin Jumper Definitions

Default Settings Designated with *

Jumper Designation	Jumper Definition	Function with Jumper Installed (Short)	Function with Jumper Removed (Open)
P5	B-Mode State Selection	State 1 - 80°, 9Hz	* State 2 - 30°, 12Hz
P6	Mode Selection	B-Mode Operation	* M-Mode Operation
P9	Probe Drive	* Probe drive connected	disconnected
P10	Power Control	Power on	* Power off (externally controlled)

Servo PCB Three Pin Jumper Definitions

Default Settings Designated with *

Jumper Designation	Jumper Definition	Function with Jumper Installed Between Pin 1 and Pin2	Function with Jumper Installed Between Pin 2 and Pin3
P7	M-Mode Command Source Selection	External M-Mode Command from the Digital PCB	* Internal M-Mode Command from (R49)
P8	Error Amp Connect	* Normal operation	Reserved for alignment (shorts error amp inputs)
P201	Open Vs. Closed Loop	* Closed Loop	Open Loop

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